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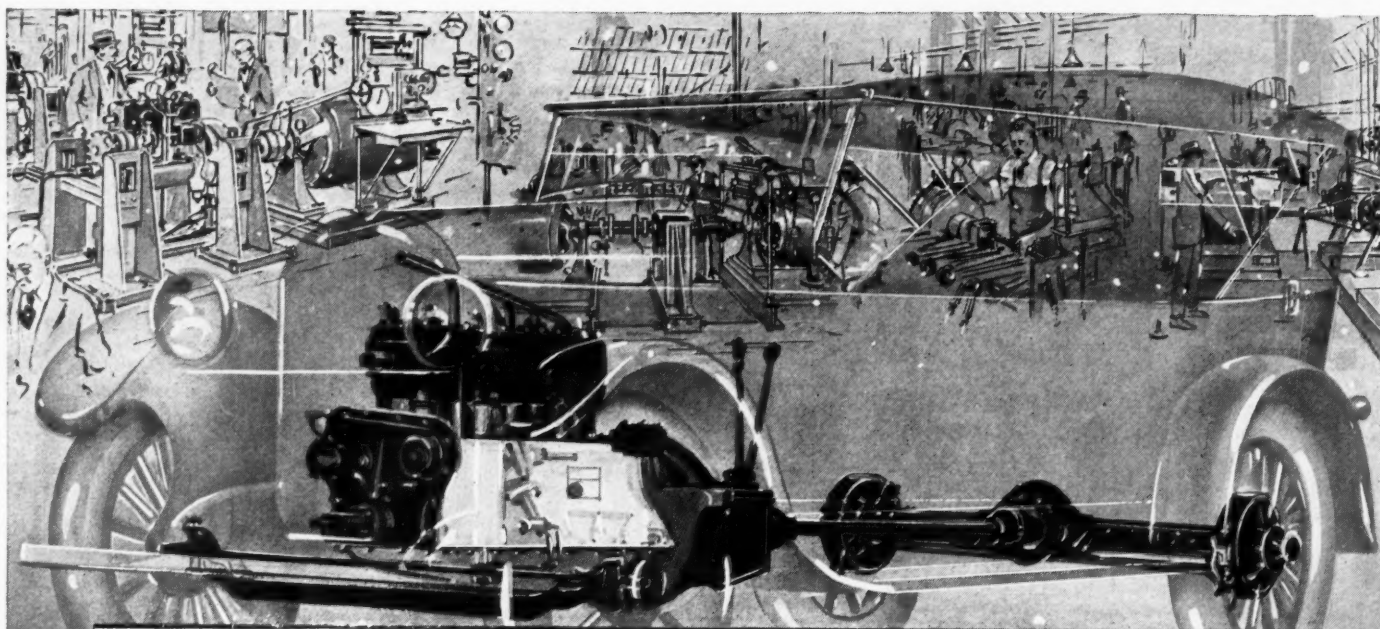
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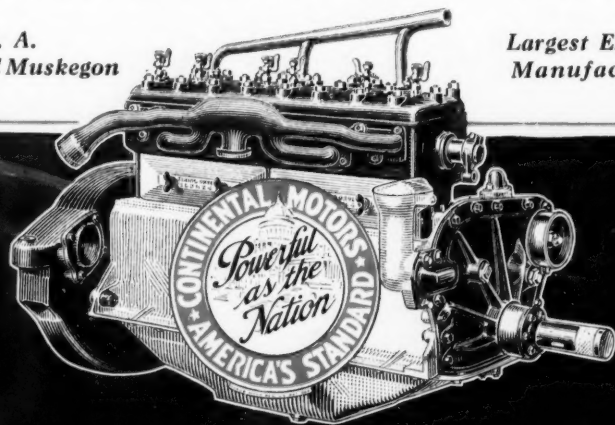
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NEW YORK—THURSDAY, JULY 20, 1922

No. 3

Freight Blockade Will Delay Industrial Recovery

Shop men's walk-out is putting much railroad equipment in cripple class. All available rolling stock will be needed to move coal and crops when strike is ended and harvests begin. Probable blockade may have a considerable bearing on motor vehicle production.

By James Dalton

THREE-QUARTERS of a million motor vehicles produced in three consecutive months of 1922! frequently referred to in tones of awe for two years. The total for the first half of 1922 is 1,140,000.

At the beginning of the year anyone with the temerity to predict such an astounding total for the second quarter would have been classed, without hesitation and without argument, as a lunatic.

But production figures don't lie. They stand before us in proud array:

April	219,448
May	256,302
June	271,022

Total746,772

How long this quarter mark will stand remains to be seen, but it probably will be something to shoot at for some time to come. It runs far beyond what has become affectionately known as "the peak" of 1920, which has been so

PRODUCTION of passenger cars and trucks in the second quarter of 1922 reached approximately 750,000, shattering all records.

If the pace of the last half of 1921 is maintained for the rest of 1922 it will make this a "two million car" year.

The apparently insatiable demand for motor cars indicates that it would not be difficult to equal or exceed last year's output for the last six months, but there is one obstacle in the way.

That obstacle is an almost inevitable and probably unprecedented freight congestion when the miners' strike ends and the movement of coal begins practically coincidentally with the grain harvests.

An extraordinarily large amount of rolling stock is in bad order.

This situation cannot fail to have an effect on the automotive industry, but it will be peculiarly fortunate because it sells transportation.

Production for the last half of 1921 was 858,000. If the factories do as well in the next six months the year's output will reach 1,998,000 and 1922 will become a "two million car year."

The biggest year on record was 1920 with a total of 2,205,197 cars and trucks. The next best was 1919 with 1,974,016 and the third, 1917, with 1,868,947. The fourth best year on record was 1921, when business was almost universally characterized as "rotten," with a total of 1,668,550.

Were it not for one factor which is almost certain to complicate the situation seriously, it would be perfectly safe to predict that

sales for the last half would equal those of the final six months of 1921. If it doesn't reach that total it won't be due to lack of demand for there seems to be an insatiable thirst for cars.

The complicating factor, strangely enough, is transportation.

Within the next three months it is practically certain there will be almost unprecedented freight congestion on the railroads. It is difficult to see how it can be averted, even if the miners strike and the shop crafts strike are settled immediately.

As soon as mining is resumed, it will be necessary to divert all available rolling stock to the shipment of coal if suffering is to be averted the coming winter in the northwest and other sections remote from the coal fields. Much of the winter reserve should have been accumulated before now, but on the contrary such stocks as have been on hand have been depleted.

Boats on the lakes which should be heading for Duluth and other ports, loaded with coal, are going back empty. This lake fleet usually relieves the railroads of much of the coal-carrying burden, but water shipments this year will, of necessity, be much smaller than usual.

If there is a resumption of work in the coal fields almost at once, as now seems probable, little progress will have been made in the laborious process of building up reserves before the railroads will be called upon to move the huge harvests in the great grain-growing belt. This is another emergency situation which has to be met each year by the diversion from other purposes of a large amount of rolling stock. It is significant that automobile cars serve admirably for the shipment of grain.

The coal strike alone has been serious enough, although the public generally does not seem fully to have understood its potentialities, but it has been complicated by the walkout of workers in the railroad shops. Few persons believed that in less than two weeks such a strike could cripple the railroads so seriously. Movement of freight trains has been slowed up materially, many passenger trains have been taken off and numerous mail trains cancelled.

While none of the men who actually operate trains have been involved, the strike has played havoc with rolling stock and the number of locomotives and cars reported in bad order has mounted alarmingly. Evidently the public did not realize, before the strike began, how close to the cushion the railroads were playing in the way of rolling stock. The number of new engines and cars ordered by the carriers in the two years up to the beginning of 1922 was pitifully small. That on hand has been subjected to a very severe strain and repairs made were in many cases of an emergency nature. The consequence has been that neither cars nor locomotives have stood up under heavy traffic as they would have done under normal conditions. Rolling stock ordered cannot be delivered soon enough to ease the situation.

Even before the strike began nearly 15 per cent of the freight cars of the country were in bad order and 25 per cent of the locomotives. No one knows how many have been added to the list of cripples as the result of the strike, but it is certain the number is very large.

It is easy to see, therefore, what will happen when coal production is resumed and it becomes necessary to move the grain crops. The railroads, handicapped by an extraordinary amount of broken down rolling stock, will have their hands full to handle these commodities alone.

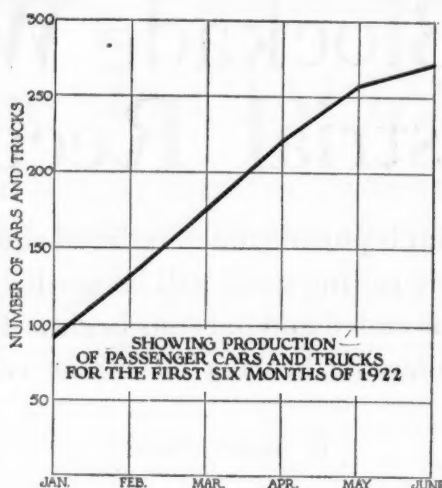
The coal strike began April 1 and shippers have had comparatively little difficulty since that time in getting cars to carry their freight, BUT—

If the normal amount of coal were being shipped there undoubtedly would be freight congestion at this moment, even without the shop men's strike. If coal were moving in the usual volume, the railroads would be having an almost unprecedented volume of business for this period of the year.

It is significant that freight car loadings for the week ended July 1 were 876,896 compared with 776,079 for the corresponding week of 1921 and only 891,621 for the same week in 1920 when it was difficult to make shipments either of raw materials or finished products. The largest number of cars loaded in any week of 1921 was 962,292 in the week ended Oct. 22. The record for 1920 was established the week of Oct. 15 with 1,018,539. There were only five weeks in 1921 which exceeded the record of July 1.

It is also significant, under the present circumstances, that freight car loadings always are at their peak in August, September and October. The fact is of peculiar importance this year because the volume of miscellaneous freight, which usually contracts in mid-summer when coal and grain shipments are heaviest, promises to expand steadily this year. The peak for the year was reached the middle of June and if reports are reliable the production of industry generally has increased each week since then,

except that which included the July 4 holidays.



Experts who have watched the situation closely declare that industry and trade as a whole will continue to make progress throughout the year. That prediction obviously is based on the assumption that there will be no serious complications. It will be the duty of the carriers to give the right of way to coal and crops. If they do that and there is a shortage of rolling stock, it is difficult to see how a glut of miscellaneous freight can be avoided.

If freight backs up, production and distribution must slow down.

Such a prospect is not pleasant to contemplate when the country is recovering so rapidly from a long period of depression and deflation, but it seems to be one of the inevitable consequences of the strife between capital and labor.

Settlement of the coal strike, by government intervention or otherwise, has been too long delayed.

The shopmen's strike ought never to have started. The stiff necked attitude of the railroad executives in connection with proposals for a settlement will not strengthen their cause with the public. The railroads have had many problems for several years and they have not prospered, but their skirts are not clean and it ill behooves them to assume a "holier than thou" attitude at this juncture, especially if it means the relapse of business when it is just recovering after a long illness.

Regardless of the merits of the controversy, it is difficult to see the justice of the carriers' contention that their employees must obey to the letter the mandates of the Railroad Labor Board when a wage reduction is involved, when the carriers question the validity of the board's ruling when the interests of the railroads are concerned.

If there is acute traffic congestion in the third quarter, the automotive industry will be peculiarly fortunate, for it deals in transportation. Its finished products can be delivered overland without great difficulty except when the destination is remote. It also is better off than many other industries in relation to supplies of raw materials. It functioned with a surprising degree of efficiency when the railroads practically collapsed in 1920 because of the shortage of rolling stock, and it can do it again, although it will mean an increase in manufacturing costs at a time when profits are none too large.

Such a condition, if it continues long, will be an eventual boon to the truck branch of the industry, which is laboring heroically to come back. The truck

makers are better off than their passenger car brothers in respect to inventories if they encounter trouble in getting in new supplies. Most of them have not yet worked off entirely the stocks they had on hand when the depression hit them.

Passenger car makers have been wise indeed in not accumulating inventories beyond their immediate needs in a period of uncertainty, but this foresight is likely to slow up their production when freight congestion comes.

Slowing up of production in the third quarter will not be an unmitigated evil, as a matter of fact. Dealers in various sections, especially in the industrial and mercantile centers, are beginning to worry again about the used car problem and if there were to be a smaller supply of new cars available for a time it would give them a breathing spell to get rid of their used stocks.

With sales slackening somewhat in the urban centers, however, there are increasing indications that the farm business is just getting under way, especially for those lines in the \$1000 class.

What Became of the War Department's Cars and Trucks

MANY concerns and individuals have been interested to learn what finally became of the passenger cars and trucks which were turned over to the Agricultural Department by the War Department for delivery to the various State highway departments, following the war. The answer to this question is given in the appended table, which shows the number of cars and trucks delivered to each State. The materials delivered to the various States included, in addition to the automotive equipment, hardware, a few rolling machines, numerous concrete mixers and a few rock crushers.

The total number of each make of truck and car delivered is as follows: International, 432; Gramm-Bernstein, 128; Nash, 7155; Heavy Aviation, 1353; Federal, 455; Pierce-Arrow, 1900; Velie, 277; Light Aviation, 600; Hurlburt, 122; Packard, 2299; White, 585; Peerless, 682; F.W.D., 3067; Wilson, 76; Standard, 307; Standard Class B, 2508; Garford, 179; Kelly-Springfield, 972; Republic, 190; Mack, 102; Denby, 103; G. M. C., 406; Commerce, 72; Moreland, 164; Selden, 129; Riker, 291; Miscellaneous, 198; Ford, 2739; Dodge, 1118; Miscellaneous, 716.

The number of cars delivered is as follows:

Table Showing How Surplus War Material Was Distributed to the Highway Departments of the Various States

State	Per Cent	Estimated Total Cost of Material Delivered	Total Number of Trucks	Total Number of Cars	State	Per Cent	Estimated Total Cost of Material Delivered	Total Number of Trucks	Total Number of Cars
Alabama	2.12	\$2,352,057	430	104	New York	5.05	7,874,065	1,384	195
Arizona	1.44	2,436,823	326	30	North Carolina	2.34	3,777,655	737	114
Arkansas	1.72	2,376,257	372	76	North Dakota	1.59	1,621,603	344	49
California	3.37	4,463,012	775	133	Ohio	3.86	5,372,866	1,000	176
Colorado	1.83	3,189,530	487	60	Oklahoma	2.40	2,692,467	548	80
Connecticut	0.66	776,426	151	26	Oregon	1.62	2,058,265	363	47
Delaware	0.50	419,263	45	14	Pennsylvania	4.65	4,528,909	834	167
Florida	1.21	2,126,165	287	73	Rhode Island	0.50	336,770	61	17
Georgia	2.73	4,244,778	630	139	South Carolina	1.45	1,964,464	355	58
Idaho	1.28	1,563,328	298	37	South Dakota	1.65	2,904,169	431	69
Illinois	4.44	6,314,468	1,006	188	Tennessee	2.25	3,938,101	538	116
Indiana	2.68	5,067,439	677	125	Texas	6.05	7,855,378	1,365	205
Iowa	2.88	3,627,527	738	126	Utah	1.16	1,439,278	274	23
Kansas	2.87	3,819,984	727	99	Vermont	0.50	748,818	126	23
Kentucky	1.94	2,415,469	475	101	Virginia	1.99	3,270,993	454	103
Louisiana	1.36	2,001,044	343	59	Washington	1.51	1,478,738	316	44
Maine	0.95	1,129,080	206	42	West Virginia	1.10	3,251,135	370	37
Maryland	0.88	1,674,163	271	40	Wisconsin	2.59	3,735,374	604	153
Massachusetts	1.50	1,286,304	207	76	Wyoming	1.28	1,133,277	236	28
Michigan	3.08	6,033,424	786	140					
Minnesota	2.90	3,384,433	621	97		100.0	\$139,752,988	23,506	4,037
Mississippi	1.77	2,994,715	422	86	Retained by Dept. of Agriculture		10,473,750	1,246	536
Missouri	3.35	4,448,381	919	115					
Montana	2.12	2,291,787	408	64					
Nebraska	2.16	3,210,623	456	86					
Nevada	1.30	1,314,817	249	32					
New Hampshire	0.50	532,853	122	17					
New Jersey	1.29	2,128,139	369	98					
New Mexico	1.63	2,148,374	369	50					
							\$150,226,738	24,752	4,573

*The value of the materials above listed is exclusive of the material delivered to the states from the surplus at Camp Grant, Rockford, Ill.

Revised World Registration Figures Show Increased Total

Principal differences recorded are in Australia, Hawaii, and Dutch East Indies. Returns from some countries not before included are now given. Revised total exceeds former estimate by about 61,000, but all figures given are not as of Jan. 1st, 1922.

By David Beecroft

SINCE the world statistics of motor vehicles were published in the Statistical Issue of AUTOMOTIVE INDUSTRIES, Feb. 16, 1922, many belated returns have been received from countries from which information could not be obtained after a campaign of nine months, but they alter the world total of motor vehicles, given at that time, by about 61,000.

The supplemental returns generally show an increase, however. In Australia, for example, the revised figures give a total of 89,191 as compared with 73,900 published. Another increase is in Hawaii with 15,000 vehicles as compared with 1,500. On the other hand some later figures tended to reduce the totals of last February, a conspicuous example being the Dutch East Indies where different authorities place the total at 25,000 instead of 45,000 originally given.

Figures have been obtained from many countries where no figures were available previously, such as Persia, with 812; Chosen, 400; Island of Martinique, 884; British East Africa, 1,650; Belgian Congo, 200; Libia, 700; Greece, 3,000; Serbia, 1,500, and Finland 2,000.

The revised total world registration, as shown by the accompanying table, is 12,649,793 cars and trucks.

North and South America

ALASKA at the end of 1921 had approximately 637 motor vehicles, of which 150 were trucks. In use in the following cities were:

City	Cars	Trucks
Juneau	109	53
Ketchikan	85	50
Fairbanks	150	30
Anchorage	40	20

According to the Department of Commerce, 100 additional motor vehicles were in use in other parts of the country. During 1921, seventy cars and fifteen trucks were shipped to Alaska.

The British island of Jamaica, according to latest figures from the American Consul, has 1,876 cars and 259 trucks. It is estimated that the cars are 95 per cent. of American manufacture. Of the 259 motor trucks seventeen are of British manufacture and the remainder American. There are sixty motorcycles on the island, of which twenty are equipped with side cars. Approximately 75 per cent. of these are of American manufacture.

The Republic of Argentina was credited in the previous census with a total of 75,000 automotive vehicles, this estimate being of the latter part of 1921. This

registration, however, is increased to 85,000 by M. T. Meadows, manager of the Chamber of Commerce of the United States in the Argentine Republic, writing from Buenos Aires under date of June 14. This increase of 10,000 was made possible largely because of the heavy sales of Ford cars and trucks from the assembly plant maintained in the Argentine capital. During the 1921-22 sales season, this output averaged well above 1,000 monthly and, at the peak, reached a total of about 1,500 cars. Furthermore, shipments from Canadian plants of American manufacturers were heavy to Argentina during the last seven or eight months. Mr. Meadows gives 16,000 as the number of automotive vehicles in the city of Buenos Aires, a gain of about 2,000 since Jan. 1, 1922. This estimate is in line with previous calculations that about four-fifths of the automobiles in Argentina are owned outside of the cities.

Chilean Figures Increased

There were approximately 12,500 motor vehicles in Chile on Jan. 1, 1922, as compared with 10,000 previously reported. During the past three years the number of automobiles in Chile has increased 20 per cent. The numbers in use in some of the leading cities are:

Santiago	3,906	Iquique	107
Vina del Mar	718	Temuco	91
Valparaiso	690	Curico	86
Punta Arenas	495	Talca	84
Concepcion	383	Valdivia	67
Antofagasta	375		

OUR registration of 10,000 in Uruguay has been increased to 12,000. In the capital, Montevideo, there were registered in April, 1922, 5042 vehicles. There are approximately 450 trucks in Uruguay.

The Fiat company has given the following figures as to the number of motor vehicles in French Guiana and Dutch Guiana in South America and the three small islands known as the Dutch West Indies:

Dutch West Indies	200
Dutch Guiana	100
French Guiana	100

The French Island of Martinique, remembered for its earthquakes of years ago, has 884 cars and trucks. Its motor statistics are:

Cars	755
Trucks	129
Motorcycles	25

During 1920 there were sold 136 cars and in the first ten months of last year thirty-two. Farm tractors are not used.

There is considerable discrepancy as to the number of motor vehicles in Greece, Fiat placing the number at 3,000 and the American Consul at 1,866.

Jugoslavia also offers a conflict of figures, the Department of Commerce giving 3,000 and Fiat 1,866.

Serbia, on which there was no previous information, has 1,500.

Sweden has 20,000 motor cars and 5,000 trucks, a total of 25,000. To this may be added 17,542 motorcycles. This information has been furnished by Capt. Neren of Stockholm and corroborated by the figures of the Fiat company of Italy.

Motor vehicles have been practically barred from Iceland since April 1, 1921, the government having raised a prohibition against their importation.

Esthonia and Lithuania, two of the new Baltic countries bordering on Russia, have motor vehicles as follows:

	Cars	Trucks
Esthonia	1060	320
Lithuania	1800	405

Of the total of 1,380 in Esthonia, 726 are in Reval, the capital.

Finland in its total of 2,000 motor vehicles has 1,450 cars and 550 trucks. To this could be added 960 motorcycles, 135 taxicabs and four motorbuses. The capital, Helsingfors, has approximately half the cars and trucks, and all of the taxicabs and motorbuses.

Albania, located across the Adriatic Sea from the heel of Italy and with Durazzo as capital, is credited with 250 vehicles.

The island of Cyprus in the eastern end of the Mediterranean Sea has 200.

The British island of Malta in the Mediterranean Sea has 350 vehicles.

Asia and Oceania

THE Federated Malay States, with Singapore as capital, in which we recorded 8000 motor cars, according to the Fiat company has 11,000 cars, of which 4500 are in Singapore.

One of the biggest errors was in connection with the motor cars in the Dutch East Indies composed of the

islands of Java, Sumatra, Celebes, and smaller ones. These islands have a motor population of 25,000, and not 45,000 as previously published. The figure of 25,000 has been corroborated from several sources.

Persia, a country on which no information was available, according to the American Consul at Teheran, has 812 motor vehicles. Previous to 1920 there were perhaps not over forty motor vehicles in private use but the withdrawal of the British military authorities at that time left large numbers of them at various points throughout the country. During the past year there were auctions of these vehicles and even today the number of Fords and other cars is not definitely known. Of the 812 vehicles listed, 283 are in Teheran and 406 are registered in Kazvin and Kermanshah. There are 123 others registered in six of the other towns of the country.

CHOSEN, known formerly as Korea, is a rich agricultural country with 16,000,000 population and an area larger than North Dakota, but there are not over 400 cars in this territory. The country has 1,135 miles of railroad, and Seoul, the capital, is a city of 250,000. Japan has spent \$80,000,000 in building railroads and a program of highway building with modern bridges is under way.

Australian Figures Changed

Australia, on Dec. 31, 1921, had a total of 89,191 cars and trucks, according to figures issued by the Motor Traders Association of New South Wales. To this could be added 47,906 motorcycles. These are divided among the six provinces of the Commonwealth, as follows:

	Cars and Trucks	Motorcycles
New South Wales.....	32,189	13,305
Victoria	23,100	14,327
Queensland	13,446	7,728
South Australia	13,634	9,740
West Australia	4,040	850
Tasmania	2,782	1,956
Total	89,191	47,906

During 1921 there were imported into Australia 9,507 chassis.

Ownership of Cars and Trucks by Countries

Abyssinia	20	Egypt	5,084	New Foundland	600
Alaska	637	Esthonia	1,380	New Zealand	37,500
Albania	250	Federated Malay States	11,000	Nicaragua	370
Algeria	12,000	Finland	2,000	Nigeria	2,000
Angola	250	France	236,146	Norway	14,340
Argentina	85,000	French Guiana	100	Panama	1,950
Australia	89,191	French Togoland	66	Paraguay	500
Austria	16,350	French West Africa	230	Peru	3,343
Azores	80	French Equatorial Africa	230	Persia	812
Bahama	150	Germany	91,384	Philippine Islands	12,381
Barbados	1,000	Former German Southwest Africa	203	Poland	10,700
Belgian Congo	200	Gold Coast	3,500	Porto Rico	6,500
Belgium	33,200	Great Britain	497,582	Portugal	5,000
Bolivia	300	Greece	3,000	Portuguese East Africa	400
Brazil	25,000	Guadeloupe	500	Reunion Island	35
British Guiana	1,050	Guatemala	500	Roumania	8,500
British Honduras	63	Hawaii	15,000	Russia	35,000
British East Africa	1,650	Holland	13,500	Salvador	400
British West Africa	566	Honduras	200	Serbia	1,500
Canada	463,448	India	45,983	Senegal	127
Canary Islands	1,200	Indo China	2,300	Siam	2,187
Ceylon	5,350	Italian Somaliland	66	Spain	37,560
Czechoslovakia	4,133	Italy	53,000	Sweden	25,000
Chile	12,500	Jamaica	2,135	Switzerland	18,011
China	8,150	Japan	12,260	Trinidad	2,221
Chosen	400	Jugoslavia	3,000	Tunis	1,990
Colombia	2,000	Libia	700	Turkey	5,500
Costa Rica	200	Lithuania	2,205	Union of South Africa	26,468
Cuba	20,000	Madagascar	500	United States	10,505,660
Cyprus	200	Malta	350	Upper Senegal	23
Denmark	22,260	Madeira Island	131	Uruguay	12,000
Dominican Republic	1,800	Martinique	884	Venezuela	2,500
Dutch East Indies	25,000	Mauritius Island	1,600	Zanzibar Island	90
Dutch West Indies	200	Mexico	25,000		
Dutch Guiana	100	Monrovia	3		
Ecuador	500	Morocco	2,500		

12,649,793

The total figures for Australia are in excess of 73,900, published in the statistical issue, which were not as of the close of last year.

The previous estimate of 1,500 motor vehicles in Hawaii was wide of the mark, although the information came from what appeared to be a reliable source. However, on Dec. 31, 1920, there were 7,117 cars in Honolulu, and the Pond Co., Ltd., estimates that on the three remaining Islands of Maui, Kauai, and Hawaii, there are practically as many more, making an estimated total of 15,000.

NEW ZEALAND has between 4000 and 5000 motor trucks registered, according to J. J. Cousins, general secretary of the New Zealand Motor Trade Association, and consequently the February figure of 2500 trucks for the country was too low.

African Registration

No figures were available in February from British East Africa, but since this information from three different sources, all in practical agreement, gives some valuable facts. The Royal East African Automobile Association gives the following figures which are practically the same as those furnished by the American Consul for the country:

Cars	1500
Trucks	150
Motorcycles	1500
Tractors	98

These figures are as of Dec. 31, 1921, and are estimated to be within 2 per cent. of being correct. Of these vehicles 84 per cent. are owned by Europeans, and 16 per cent by natives. Practically 90 per cent of the automobile owners in British East Africa are members of the Royal East African Automobile Association which is doing excellent work in the construction and maintenance of good roads. British East Africa is comprised of four provinces, Kenya, Uganda, Zanzibar and Tanganyika.

Libia, one of the largest countries, except Egypt, bordering on the southern shore of the Mediterranean, according to the Fiat company, has 700 motor vehicles.

Abyssinia is a poor market for motor vehicles owing to primitive conditions and Fiat estimates that there are not more than twenty motor vehicles in the country, most of which are trucks.

The Belgian Congo has 200 motor vehicles.

The territory formerly known as German Southwest Africa, and which is now mandatory to the Union of

South Africa, according to the National Bank of South Africa, has the following vehicles:

Motor cars	194
Motor trucks	9
Motorcycles	36

The numerous countries along the west coast of Africa, some of which constitute what is known as French West Africa and others which are British possessions are not large absorbers of motor vehicles. Recent figures show that the three French possessions have:

Senegal	127
Upper Senegal	23
French Equatorial Africa	230

The British territory of Nigeria which was reported in February to have 441 has many more vehicles, as the importations in 1919, 1920 and 1921 totaled 1,585. Perhaps 2,000 would approximate the total in this territory.

Recent figures show that in 1920 there were imported into the Gold Coast, a British possession, 2,040 vehicles.

THE figures for the French Island of Madagascar, as of July, 1921, were 500 cars and trucks, most of these being of French manufacture, according to P. J. Stevenson, United States trade commissioner at Johannesburg.

The small Island of Zanzibar, off the East Coast, in March, 1920, had ninety cars.

In French Togoland there are sixty-six vehicles, over two-thirds of which are American cars.

The Madeira island on the West Coast of Northern Africa has 204 motor vehicles registered, of which 204 are in actual service. These are divided as follows:

Private passenger cars	60
Private cars for hire	44
Motor trucks	27
Motorcycles	22
Motorcycles (side cars)	49
Tricycles	2

According to American Consul Stillman W. Eells, motorcycles are largely of American manufacture.

At present there are 1,200 motor vehicles in the Canary Islands, located off the coast of Northwestern Africa.

Tunis, a country in Northern Africa the size of Wisconsin, and bordering on the Mediterranean, has increased its number of motor vehicles approximately 17 per cent in the last year. The figures for June 1, 1922, were 2280 cars and trucks, made up of 2047 cars and 233 trucks. There the 321 motorcycles.

Canadian Automobile Imports

IN the House of Commons, Hon. Mr. Bureau gave the following details of the number of automobiles imported into Canada, their value and the amount of customs collected during each of the last five years:

Automobiles, Passenger			
Fiscal Year	Number	Value	Duty Collected
1918	16,118	\$11,317,245	\$3,961,035
1919	6,473	5,326,510	1,864,278
1920	10,805	11,204,461	3,920,544
1921	5,907	8,399,537	2,936,004
1922	7,181	9,501,362	3,278,258
Trucks			
1918	964	\$1,275,179	\$446,312
1919	1,744	2,274,748	794,745
1920	2,274	3,831,084	1,338,386
1921	1,706	3,578,938	1,240,452
1922	806	1,537,765	533,541

Parts

Fiscal Year	Value	Duty Collected
1918	\$6,671,419	\$2,050,973
1919	6,660,770	2,095,035
1920	12,674,823	3,966,277
1921	11,760,367	3,642,198
1922	10,211,791	3,053,875

The fiscal years given in the above table run from March to March.

IN French Guiana, South America, there is an air service which has competition only from native canoes. Going inland, against the flow of the rivers, the canoes occupy from 15 to 20 days for a journey which can be made by aircraft in two hours.

122 cu. in. Grand Prix Engines Better Last Year's 183 in. Record

Felix Nazzaro averages 79.3 m.p.h. in the winning two-litre Fiat.
Engine of winning car develops 90 h.p. at 5,000 r.p.m. Not a single blowout but many mechanical troubles occur in 500-mile race.
Knight-engined Voisin wins race for four-passenger cars.

By W. F. Bradley

STRASBOURG, FRANCE, July 15—The 2-litre (122 cu. in.) cars demonstrated in the Grand Prix race to-day that they can give higher speeds than the 3-litre, 183 cu. in., ones did last year. Felix Nazzaro, a race driver familiar in America 12 years ago, won driving his Fiat the 499 miles at an average speed of 79.3 m.p.h. The time was 6:17:17. Last year Jimmy Murphy in his Duesenberg, 3-litre, averaged 78.1 m.p.h. for the shorter distance of 322 miles. This year's race was over a triangular course 8.3 miles per lap, and 60 laps were covered. All cars started in one group, three abreast across the roadway, a la Indianapolis, the first time such a start was ever used in a European road race.

It was a veritable Italian field day, the Fiats led one, two and three until near the finish when the second and third cars were eliminated, two Bugatti cars finishing second and third with another Bugatti running when the race was called off. Of eighteen starters only three finished the 60 laps. The times of the Bugattis were:

Bugatti-Viscaya	{ ...7:15:09
	68.9 m.p.h.
Bugatti-Marco	{ ...7:48:04
	64.1 m.p.h.

None of the French or English cars finished the race. All three Ballots had to retire as had the British Sunbeams.

Perhaps the greatest feature of the race was that there was not a single tire blowout from start to finish. All of the drivers had previously agreed not to carry spare wheels, being prepared to complete the circuit to the pits on a flat tire if necessary. It is the first time such sustained road race speed for approximately 500 miles has been maintained without tire blowouts.

While there were no tire troubles there was a perfect landslide of mechanical troubles, indicating that the engineers of 122 cu. in. cars have still a good deal of refining to do before the engines are seasoned products. The mechanical troubles included broken crankshafts, connecting rods, pistons and valve stems. There were some cases of broken magneto drive and one of a wheel coming off. When it is remembered that the engines in some of the cars had a crankshaft speed of about 5000 r.p.m., it is not surprising that mechanical troubles developed. This was the first Grand Prix race in which the rules restricted the entries to two litres. Last year one 2-litre car competed and finished third.

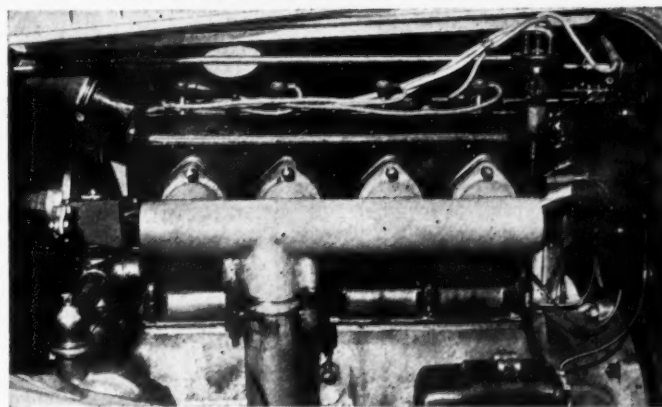
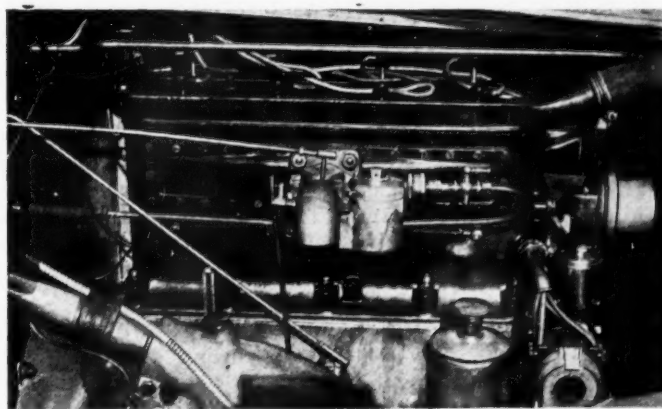
The race was run on a course slippery after heavy rains, but which dried considerably because of the strong wind which blew during the race. It was necessary to take the turns with caution. Four-wheel brakes were used on most of the cars.

The race was a Waterloo for many of the classic drivers of Europe whose names will remain forever closely associated with early racing in Europe and America. Some of those to drop out were Goux, in a Ballot, who ran through a fence but was not hurt, and claimed to have been forced off by Nazzaro, the winner.

Wagner, winner of the American Grand Prix in 1908, went out due to a broken connecting rod in the engine.

Hemery, who so frequently drove the Benz in American road races, was eliminated when his car caught fire.

Chassagne, familiar in Indianapolis races, went out with a broken valve stem in his Sunbeam. The same fate befell his run-



Two views of the Voisin-Knight engine which was used in the first three cars to complete the fuel consumption Grand Prix

French Grand Prix 2 litre race, Strasbourg, 1922

Car	Driver	No. of Cyl.	Bore & Stroke	Valves	Main Bearings	Ignition	Carbureter	Oiling	Clutch	Gears	Drive	Springs	Brakes	Wheels	Tires	Wheel-base	Track
Aston-Martin	Zborowski R. C. Gallop	4	65x112	4 Head	Ball	Magneto	Zenith	Pressure	Disk	4	Bevel	Semi-Ellip.	4 Wheel	Wire	Pirelli 710x100	98 ins.	51 ins.
Ballot	Goux Foresti Reville	4	69.9x13.	4 Head	3 Ball	Magneto	Zenith	Circulating	Cone	4	Bevel	Semi-Ellip.	4 Wheel	Wire	820x120	110 ins.	51 ins.
Bugatti	Ernest Friedrich Viscaya Mones Maury Marco	8	60x88	3 Head	7 Ball	2 Magnetos	2 Zenith	Pressure	Plate	4	Bevel	¼ Ellip.	4 Wheel	Rudge	820x120	99 ins.	47 ins.
Fiat	Pietro Bordino Felice Nazzaro Biagio Nazzaro	6	65x100	2 Head	8 Roller	Magneto	Fiat	Pressure Dry Sump	Disk	4	Bevel	Semi-Ellip.	4 Wheel Servo	Rudge	Pirelli Straight Side	98 ins.	47 ins.
Mathis	Lhams	4															
Rolland-Pilain	Albert Guyot Victor Hémery Louis Wagner	8	59x90	2 Head	Ball	Delco	Zenith	Pressure	Plate	4	Bevel	Semi-Ellip.	4 Wheel Hydraulic	Wire	820x120	98 ins.	47 ins.
Slim Pilain																	
Sunbeam	Jean Chassagne K. Lee Guinness Segrave	4	68x136	4 Head	3 Ball	2 Magnetos	Solex	Pressure	Diak	4	Bevel	Semi-Ellip.	4 Wheel	Wire	835x135	98 ins.	47 ins.

ning mate Guinness.

Guyot was eliminated due to a broken crankshaft in his Rolland-Pilain.

One fatal accident occurred. Biagio Nazzaro, nephew of Felix Nazzaro, the winner, was killed when his Fiat overturned in the fifty-third lap, when he was running in third position, and his mechanic was seriously injured.

The Fiat team dominated the field throughout the race, except for a brief period of five minutes when Frederick Bugatti took the lead. The Fiats ran one, two, and three, for most of the race, and two laps from the finish were holding second place, as well as lead-

ing. Bordino lost a rear wheel after having held all lap records during the race. His withdrawal and Biagio Nazzaro's accident happening within a few minutes of each other, lost second and third places when they were leading the nearest Bugatti by nearly an hour.

In addition to the two Bugattis which finished second and third three others that were never dangerous competitors were running at the finish.

The two British Aston-Martin cars, 1½-litre capacity, made a good showing during the first half of the race, holding their position with all the cars except the Fiats but were eliminated at 300 miles because of magneto trouble.

Voisin Knights Win "Fuel Consumption" Grand Prix

STRASBOURG, FRANCE, July 16.—Today's race for four-passenger touring cars in which each was given a definite quantity of fuel to cover the 444 miles was a great victory for the Knight sleeve valve type of engine, this type of engine winning three and perhaps more of the first positions. It was won by Rugier driving a Voisin Knight type. The race was an easy victory for Voisin, the winning car covering the distance in 6:35:09, or 67.4 m.p.h. The nearest competitor was Durai in another Voisin about two minutes behind, his time being 6:37:31.

In this race the cars were allowed 13.7 miles per gallon, and were given enough fuel to cover the distance at that rate. The cars carried four-passenger

bodies, but the driver was the only occupant. Each car carried 154 lb. weight for each of the supposed three additional passengers.

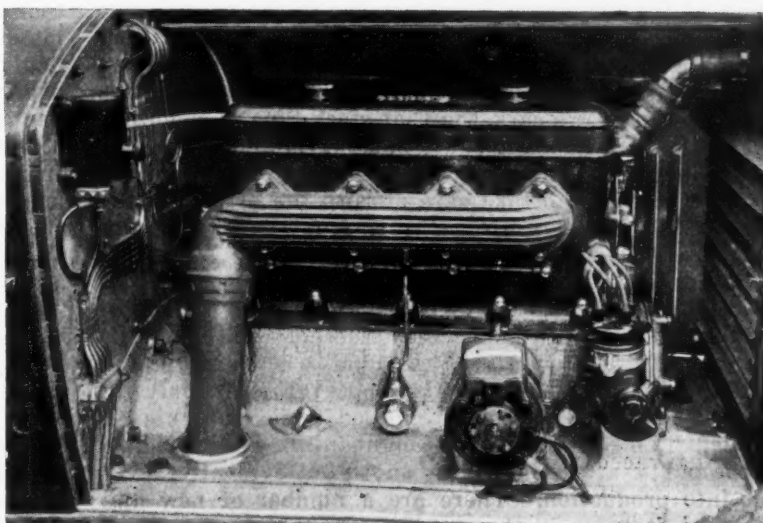
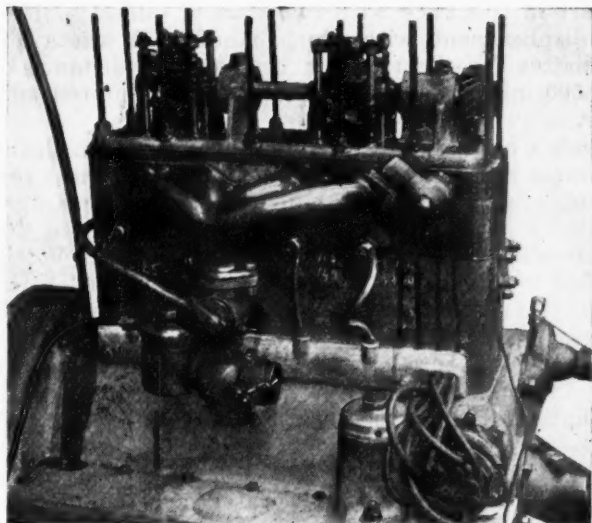
Some of the cars ran out of fuel before the finish. The three Bignan poppet-valve cars abandoned the race. The winner used a Solex carburetor. The Voisin is a four-cylinder car, 95 x 140 mm., and used magneto and Delco ignition.

The finishers were:

Voisin	Rugier	6:35:09
Voisin	Durai	6:37:31
Voisin	Gauderman	6:42:57
Peugeot.....	Boillot	6:46:41
Voisin	Piccioni	6:49:58
Peugeot.....	Artault	7:21:25

French Fuel Consumption Grand Prix, Strasbourg, 1922

Car	Driver	No. of Cyl.	Bore & Stroke	Valves	Main Bearings	Ignition	Carbureter	Oiling	Clutch	Gears	Drive	Springs	Brakes	Wheels	Tires	Wheel-base	Track
Alfred Maridet	Maridet	4	90x180	2 Head	3 Plain	2 Magnetos	Zenith	Pressure	Cone	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	128 ins.	56 ins.
Bignan	Philippe de Marne Gros Nougué	4	75x112	2 Head	3 Plain and Ball	Battery	Viel	Pressure	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	125 ins.	55 ins.
Peugeot	André Boillot Artault Péan	4	95x130	Knight	5 Plain	Delco	Zenith	Pressure	Plate	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	128 ins.	55 ins.
Slim-Pilain	Lecot																
Voisin	Rugier Gaudermann Arthur Duray Piccioni	4	95x140	Knight	5 Plain	Magneto and Delco	Solex	Pressure	Plate	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	129 ins.	55 ins.



Left, Bignan engine used in fuel consumption Grand Prix. The valves are positively opened and closed by cams mounted on vertical shafts. There are four cams for the eight valves. Right, Knight engine, used in Peugeot car in same race.

Races and Cars Compared

IT is the practice of the Automobile Club of France to change its racing rules at rather frequent intervals with the object of developing design and opening up new fields of research. For that reason it was decided this year to abandon the 183 cu. in. or 3-litre rule and adopt a piston displacement limit of 2-litres, or 122 cu. in., with a minimum weight of 1433 pounds. Probably because of the fact that this rule was not likely to call forth any great novelties of design, it was decided to hold a second race for four-passenger cars having a fuel allowance such that they must travel at least 13.7 miles to the American gallon.

This fuel consumption race, held on the same course as the 2-litre event, and on the following day, did not receive very great support from manufacturers, and has been somewhat criticised. Objection has specially been taken to the fact that there was a minimum weight empty of 3086 pounds, which is considered to be unnecessarily high.

Fuel and Weight Limitations

In order to avoid criticism such as that which arose last year due to the fact that the air entering the carburetor was drawn through the crank case it was decided that all oil and grease required for the engine and the gearset should be deducted from the total quantity of fuel allowed for the 444 miles of the race. In other words competitors had as much oil and grease as they required to the detriment of their gasoline allowance. In order to make it more difficult to dodge the rules, the decision was reached to allow only the driver aboard the car and to forbid all outside supplies of any nature whatsoever.

Consequently the cars had to carry, in addition to 463 pounds of ballast representing three passengers, all the wheels and tires likely to be needed in the race. Minimum body dimensions were imposed and the length of the tail was limited, to the dissatisfaction of competitors, who were of the opinion that they ought to have been given greater liberty to develop stream line bodies.

Competitors entered in the 122-cu. in. race were Ballot, Rolland-Pilain, Bugatti, Slim-Pilain and Mathis representing France; Sunbeam and Aston-Martin from Eng-

land, and Fiat from Italy. Delage entered the race with a team of cars, but decided not to start owing to unpreparedness. With the drop to 122 cu. in. the eight-in-line engine lost its numerical superiority. It was used by Rolland-Pilain and Bugatti only. Fiat used a straight six engine and the others had four cylinders.

The best results prior to the race had been obtained by Fiat. The power output per unit of piston displacement is higher than secured from last year's 183 cu. in. engines, and, despite the reduction in size, the small cars are faster than the bigger ones of a year ago. It is difficult to make direct comparisons, so far as the race is concerned, for the course and the distance change each year, but it is already possible to form the opinion that when the 2-litre cars are seen on the Indianapolis track next year there will be little if any loss in average speed.

The Fiat 2-Litre Cars

Fiat has developed the 2-litre cars on the same general lines as the bigger models. Cylinders are of steel construction with welded on sheet steel water jackets, one jacket being common to three cylinders, thus providing the engine with two groups of cylinders. Dimensions are 65 x 100 mm. bore and stroke. As on the bigger engines there are only two valves per cylinder, inclined in the head, with operation by two camshafts, with a very light follower between cam and valve. A vertical shaft and bevel gearing at the rear is made use of to drive the overhead camshafts. Ignition is by means of magneto, with a single plug in the head. Lubrication is under pressure, without any oil in the base chamber. A single carburetor of Fiat design is employed.

A peculiarity of the engine is the adoption of a special type of roller bearing, developed in the Fiat shops, and which is used in every part of the engine with the exception of the wrist pins. There are eight bearings for the main shaft. The engines have been run for several consecutive hours under full load at 5000 r.p.m. and develop rather more than 90 hp.

Main features of design, apart from the engine, are similar to those of the stock Fiat cars. A unit construction engine and gear box is adopted, with direct attach-

ment of the aluminum base chamber to the main frame members. The clutch is multiple-disc type and there are four speeds ahead and reverse. Instead of the open propeller shaft, double universal joints and Hitchkiss drive of last year's cars, the Fiat stock type of combined rear axle and propeller shaft housing is adopted. This is formed of two stampings in the form of a T welded together and has to take care of both the drive and the torque. Springs are semi-elliptic front and rear, supplemented by Hartford shock absorbers.

Brakes are fitted on front and rear wheels with foot operation through a servo-mechanism for all four, and hand control for an independent set of brakes on the rear wheels. Track is 47 in. and wheelbase 98 in. Total weight is 1455 pounds empty; this is only 22 pounds above the minimum imposed under the rules.

Bugatti raced with a type of eight-in-line engine shown to the public at the last Paris show, but evidently never put into production. There are a number of new and patented features in the car, some of which were tried out for the first time in the race. The cylinders, which measure 60 x 88 mm., are in a single casting with separate head, this latter receiving three valves per cylinder; the single exhaust valve measuring 32 mm. and the pair of intake valves each having a diameter of 23 mm. The overhead camshaft drive is at the front, the water and oil pump drive is by means of a cross shaft at the foot of the vertical shaft and the two magnetos are at the rear, driven directly off the camshaft. Two carburetors, are used. The crankshaft is carried in ball bearings, with plain bearings for the connecting rods.

Bugatti's distinctive type of quarter elliptic rear spring, with the thick end rearwards was used in his racing car. Among the peculiarities is the use of compressed leather for most of the steering connections. Brakes are fitted on both front and rear wheels, a feature of the design being that no adjustment is required, for the brakes are said to maintain their full efficiency until the lining is completely worn down.

Sunbeam Has Special Axle

The Sunbeam racers were a development of the 1500 cc. Talbot Darracq cars which were so successful last year, for these two companies now form one organization. The four-cylinder engines of 68 x 136 mm. have ball bearing shafts with plain bearings for the connecting rods and four valves per cylinder operated by a train of spur pinions and two overhead camshafts. One of the distinctive features of the Sunbeams is the adoption of a three-piece front axle, the center portion between the road springs being I-section and the two extremities being cylindrical. This design has been adopted in order to increase the torsional strength of the front axle under heavy braking stresses.

The Rolland-Pilain cars, with eight cylinder engines of 59 x 90 mm. ran in the race with the ordinary method of valve closing by means of coil springs. It appears that the system of positively and mechanically closing the valves has not yet given the results expected of it. These engines are of the two-valve type, with the valves at an angle of 160 deg. and the spark plug in the head. Magnesium pistons produced in France under the German process known as Elektron are made use of in these engines. The Rolland-Pilains have hydraulic brakes on the front wheels; the rear wheel brakes are separately operated by hand.

Ballot this year raced with the same type of car used in last year's events. Some reduction has been made in weight, the engine has been speeded up and more attention has been given to stream lining. Aston-Martin

took part in this race with two cars of only 1½ litres piston displacement, with which handicap it was a difficult matter for them to win even over a distance of nearly 500 miles. Mathis and Slim-Pilain entered only one car.

Of the six cars entered in the fuel consumption Grand Prix, Voisin and Peugeot were considered the most serious contenders. They both built engines of the Knight sleeve valve type, but not under Knight's license, for these patents are no longer valid in France. The Voisin is claimed to be the firm's standard sporting model, but while on the same general lines as the stock models has many detail modifications. Cylinder dimensions are 95 x 140 mm. There is a direct supply of oil to the sleeves, and in addition to a Zenith magneto driven off a cross shaft at the front there is Delco equipment. A compression of eight kilos (113 pounds) is declared to have been adopted on the Voisins and because of this a special type of plug, completely water jacketed, and designed by the Voisin Company, is made use of. Front wheel brakes of the Perrot type are fitted. Springs are semi-elliptic front and rear, supplemented by a double type of Hartford shock absorber built in France.

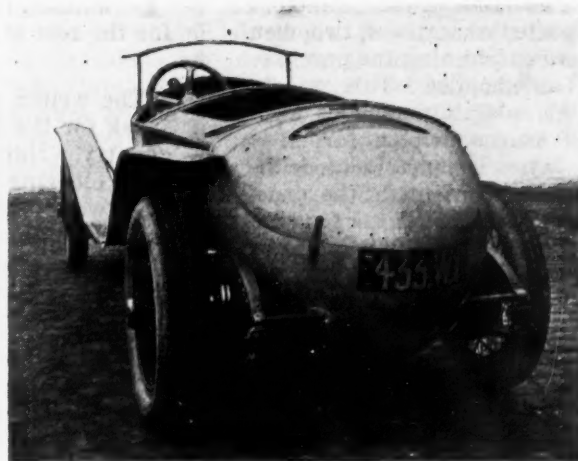
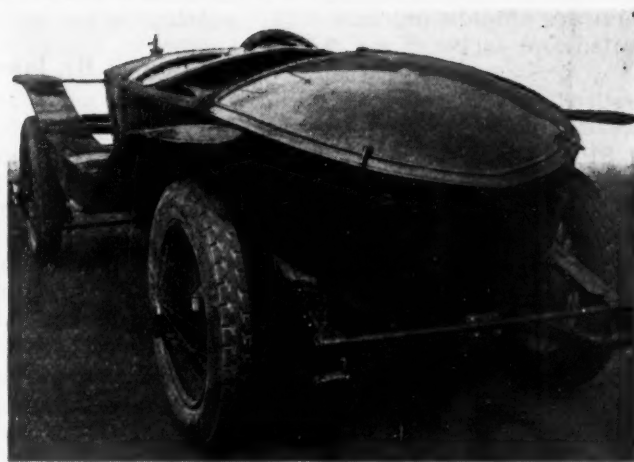
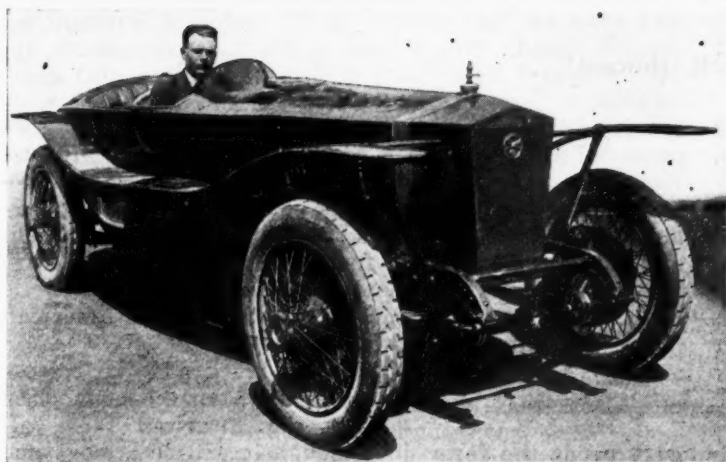
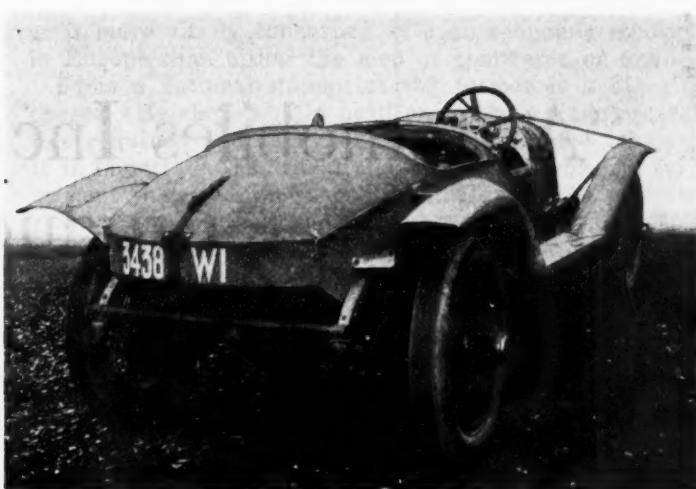
Knight Engine in Peugeot

The sleeve valve engine entered by Peugeot is the first of its type to be built by this firm. The company states that this model will be put on the market next year. The engine has four cylinders in a single casting of 95 mm. bore and 130 mm. stroke, with a five plain bearing crankshaft and plain bearings for the connecting rods. Delco ignition is used with the distributor at the front end driven off the same shaft as the water pump. With crankcase webs brought right up to the frame members and the dash a close fit to the clutch housing a particularly neat engine is secured.

The new Peugeots have unit construction engine and gearbox, left hand steering with center control, four speeds and reverse, semi-elliptic springs front and rear and front wheel brakes of Perrot design.

A very interesting feature of the Bignan cars entered in the fuel consumption Grand Prix is the method of positively opening and closing the eight vertical valves in the detachable head. Reno, the engineer responsible for this job, departed from previous European practice by the adoption of a couple of vertical shafts, each one of which carries two plate cams, one above the other, driven in opposite directions, each cam operating two of the four valves grouped around it. The cam operates the valves through a couple of rollers mounted by means of a sleeve construction on the valve stem, one roller being on the upper and the other on the lower face of the cam. No springs at all are used. This mechanism gave such satisfaction that the firm has decided to adopt it for next year's sporting model. The engineers declare that the ability of the valves to seat no longer constitutes a limit to the number of revolutions.

Magnesium pistons are used in the Bignan engines. The heads have a thickness of eight mm. and there is an entire absence of internal ribbing. The clearance is slightly greater than for aluminum pistons, and the skirt is only a trifle thicker. The piston displacement of the Bignan engine is two-litres, bore and stroke being 75 x 112 mm. It has an exceptionally heavy shaft carried in a combination of ball and plain bearings. Connecting rods are tubular and the lower cap of the connecting rod bearing is provided with light fins to assist in the radiation of heat. White metal is run direct into the caps. Battery ignition is fitted with the use of a new combined coil and distributor produced by the Italian



At top, front and rear views of the Voisin car which won the French fuel consumption Grand Prix race. The spare wheel is carried flat in the tail. Note also the front wheel brakes. Center, front and rear views of the Bignan car in the same race. Rear axle is enclosed to decrease wind resistance. Note combined running board and fenders. Bottom, left, three-piece front axle used on Sunbeam. The tubular end pieces are designed to take the torsional strains of the front wheel brakes. Right, rear view of Peugeot, showing type of cowling employed

Marelli company. The carbureter is a Viel, a new model not yet put into production, with which the engineers declare excellent results have been obtained. Ease of dismounting is one of its distinctive features; either one or other of the two jets can be taken out and changed while the engine is running.

The Bignan has an aluminum rear axle reinforced with steel tubes. In addition to front wheel brakes of the Perrot type it has the Hallot servo-mechanism, by the means of which it is impossible to lock the wheels. With the two-litre piston displacement this engine was at

a disadvantage under the fuel consumption rules compared with the bigger sleeve valve engines built by Voisin and Peugeot, but it is nevertheless full of interesting features.

A few other manufacturers started out with the idea of building a two-litre engine which could be used in the two-litre Grand Prix and also in the fuel consumption event, but they discovered that a satisfactory engine under a piston displacement rule was not suitable for a race in which the amount of gasoline was limited.

"Automobiles Increase Agricultural Production"

James Howard, President of the American Farm Bureau Federation, considers automotive products essential to agricultural development. Service on power farming equipment important. More fundamental information needed concerning transportation.

By James R. Howard*

I SPENT five years in a county bank some years ago, and, among other things, carried the responsibility of making recommendations for loans. One experience I remember particularly.

Two farmers wanted to borrow approximately one thousand dollars each on hogs which they were feeding. When the board met I laid this request before it, and the president was glad to accommodate these men, when to tell the truth the farmers were accommodating the bank, for we had money to loan.

Then one of the directors reported that these two men were considering the purchase of automobiles. This was in 1907, when automobiles were not as common on farms as to-day. The president withdrew his consent for the loans, explaining that if ten farmers in each township in Iowa should buy automobiles the banks would go broke.

Now, this banker was honest in his convictions, but today we know that the automotive industry has been of material help to agriculture.

In the first place it has developed into a giant industry, furnishing employment in mines, forests and factories, to say nothing of increasing transportation and stimulating many other lines of activities. It has taken natural resources to improve our standards of living and given profitable employment to an army of laborers. It developed at a most fortunate time for agriculture, for there were unmistakable signs of a stagnation in the agricultural market. I am not sure, but it is entirely possible that the increased demand for agricultural products created by the development of the automotive industry has paid for the farmers' automobiles.

Nothing makes me more out of sorts than to have someone proclaim that the farmer should not have an

automobile. The car is a necessity on the farm. Its use increases agricultural production. It relieves the monotony of farm life. It makes agriculture a more pleasant and profitable life work. It has brought contentment and happiness and never forget that a happy people are better off than a rich people. Above all, the automobile is one of the factors which is going to keep the American farmer from becoming a peasant.

THE automotive industry needs the farm market. How big will that market be for the rest of this year?

* * *

The writer of this article is better able to speak for the farmer than anyone else in the country. Howard says that the farmer has been clearing off his obligations during the last two years, and that it is better that he should do this than purchase.

Howard also believes that "a good part of this year's crop will go to the bankers."

* * *

Here is an able article by a competent authority. It deals with probable developments in the farm market this fall, as well as the more fundamental relationships between the farmer and the automotive industry.

The truck and the tractor both have an economic place on the American farm, although it will be a long time before they can replace the horse. My own experience, on a relatively large farm for Iowa, is that a combination of the tractor with horses gives better results than horses alone or depending too much upon the tractor. As we get better mechanical units, however, and better understand how to operate them, the use of the tractor and truck will increase. Service on power farming equipment is especially important.

The reduction in freight rates to take effect on July 1 will help materially in restoring the farmer's economic condition, but it is not enough unless the prices of agricultural products go up. The

most helpful sign on the transportation horizon is the proposal of Bird M. Robinson, president of the American Short Line Railroad Association, for the formation of a National Transportation Institute to be financed by private funds.

We need to make a thorough study of our transportation problems and possibilities from a national standpoint looking toward a coordination of our highways, waterways and railways. The work of such an institute should be so thorough that its findings and reports will have wide, general acceptance. A temporary organization to develop such an institute is already at work.

Just to illustrate how the work of such an organization might affect the farmer, take my own case. I expect to

*President American Farm Bureau Federation.

build a house on the farm soon. There is also the hauling of farm supplies and products. Now I want to know whether I can haul the materials for that house at the least expense with horses and wagons, tractor and trailers or trucks. We need fundamental information describing the spheres of our different systems of transportation.

Standardization of farm operating equipment will come but progress will be gradual and the work must be kept within reasonable limits. If we could do away with present equipment and manufacturing facilities over night rapid progress could be made, but this is impossible. In any standardization program account must be taken of equipment in the users' hands and the manufacturing situation. There is much old equipment to be worn out before new equipment, even though it be standardized, will replace it.

During the past two years much has been said about the farmers' troubles. Well, I guess that we have had our share, but as I see it they center chiefly around three things: transportation, credit and markets. Of these three, markets are by all odds the most important. The farmer can have abundant credit, cheap. The farm-

er is more vitally concerned with an economic recovery in Europe than either the men of commerce or finance.

From a national standpoint the farmer is a big purchaser. He should be in position to buy all the necessities required and many of the things called luxuries. It is important that the standard of living on the farm be kept just as high as possible. During the past two years, as is too well known, the farmer has not been a good purchaser. Well, he has been doing a more important thing, clearing off his obligations, and I believe that the farmer is going to get square financially before he again enters the market in a large way. The farmer is liquidating, not buying. There is some substantial evidence on this point. For some time past money has been flowing to the financial centers in a volume which surprised the financial interests. At first it was difficult to explain this but gradually it came to be realized that the farmer was getting along with what he had and paying his obligations. This will undoubtedly continue. The farmer is going to get on his financial feet before he buys in a large way.

It is not known how long this will take but I believe that a good part of this year's crop will go to the bankers.

Motor Fuel from Corn Cobs

MORE than six years of research work by chemists in the Department of Agriculture Laboratories has resulted in the development of a process that will

(1) Make possible the production of low-priced substitutes for a wide variety of hard rubber and synthetic resin products,

(2) Provide a good market for waste farm by-products,

(3) Conserve the native supply of wood alcohol and the forest products, particularly hardwoods, used in the manufacture of wood alcohol,

(4) Provide a possible motor fuel supply.

The results of this work were recently announced through the American Chemical Society by Dr. W. W. Skinner, assistant chief of the Bureau of Chemistry. The achievement consists in the perfection of methods for producing a chemical compound known as furfural at a low price and by a simple process from corn cobs.

Dr. Frederick B. La Forge and Gerald H. Mains, of the Bureau of Chemistry, are credited with having done this work. They have successfully brought the process for the production of furfural to a commercial scale, and at the same time have aided in the development of a commercial market for furfural by supplying quantities of the material to manufacturers for co-operative research on its utilization.

The synthetic resins industry, since chemists discovered the secret of making them about 15 years ago, has had a remarkable growth. The materials used in this industry are chiefly formaldehyde and phenol (or bolic acid). These two compounds, chemically combined, condense into solid which is highly valuable as the basis for making material similar to Bakelite. Thorough tests have proved furfural to be an excellent substitute for formaldehyde in this work.

The possibilities of conservation may be seen when it is explained that the source of formaldehyde is wood alcohol, which is produced chiefly from the destructive distillation of hardwoods, such as birch, beech, oak, maple and elm. The softwoods, while they are more plentiful in America, produce such low yields of wood alcohol that

they are of small value as a substantial source of supply.

Newspaper reports have in several instances unduly emphasized the possibility of furfural as a motor fuel. A few tests made by the General Motors Company (see article by H. Hibbert, *Jour. Ind. Eng. Chem.*, Sept., 1921) in the ordinary type of engine, developed pre-ignition trouble. Further experimentation to overcome this difficulty was not pushed, doubtless due to the high cost of furfural.

Recent work at the Bureau of Chemistry experimental plant for furfural production indicates that furfural can be produced from corn cobs for about 6 cents per pound on a large scale, using, say, 100 tons of cobs per day equivalent to 6 tons of furfural. Since gasoline sells for from 3½ to 4 cents per pound, with increasing cost in sight within the next few years, and since further improvements in the process of furfural manufacture will likely reduce the price of the latter, the use of furfural as a fuel becomes a possibility for the future, but it is not immediately practicable.

IN spite of the increased imports of automotive products from Germany during the first quarter of 1922 as compared to the same period in 1921, well-known automobile agents generally agree that German cars are not popular and that competition in the future is not likely to be serious.

The unit value of imports of passenger cars, during the first quarter of the current year decreased 35 per cent, and unit value of trucks 44 per cent, as compared to the same period last year.

Of the 652 passenger cars, valued at \$807,092 imported during the first quarter of 1922, Germany supplied 388 and the United States 148. Of the 302 trucks imported, valued at \$230,010, Germany supplied 289, France 9 and other countries 4. However, the United States furnished 100 of the 145 truck chassis imported as against 30 supplied by Germany.

The large imports from Germany may be accounted for by contracts made last year which Germany has been unable to fill until the last few months.

German Buses Follow Truck Lines with Special Features Added

Spring construction is novel on several makes and arranged to improve riding qualities at all loads. Over-geared transmission used to secure higher economy in one case. Disk wheels and pneumatic tires are popular. Special starting facilities frequently used.

By Benno R. Dierfeld

GERMAN bus chassis still follow conventional truck design to a considerable extent, but many manufacturers of buses are making alterations in various units with a view to better suiting the vehicle to the requirements of passenger carrying service. Spring suspensions are being improved, by the use of progressive type springs in some cases, while pneumatic tires are quite generally employed in combination with disk wheels. The relatively high price of fuel, the cost of which is always a large item in the expense of bus operation, is being reduced in some instances by employing a special type of gearset which affords less gear reduction and a better load factor, with consequent improvement in economy.

Many buses have electric starting and lighting systems, and some employ primers or other special means to facilitate starting. Radiators usually have sectional or replaceable cores and are sometimes provided with a cushioning means to protect them from the effect of vibration and distortion. Clutches and universal joints used are much the same as those fitted in trucks and propeller shaft brakes are quite generally employed. These are provided with convenient means for adjustment, and are foot operated. Frame trusses are employed in some instances.

Since buses are usually operated at higher speeds than truck chassis a larger engine is often employed. For example, the Magirus works in Ulm use engines of the following type for trucks and buses:

Useful load in tons	Engine horsepower for		Number of seats
	Truck chassis	Bus chassis	
1-1.5	25	34	up to 14
2-2.5	34	40	14-22
3-3.5	40	55	23 or more

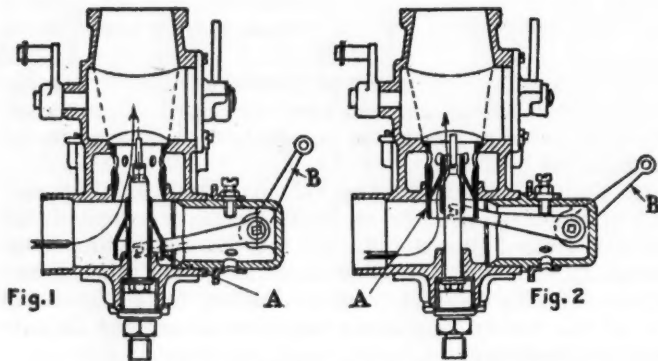


Fig. 1 and 2—Carbureter with special choke used in starting employed on Mannesmann-Mulag buses

The power of the engine employed naturally depends also upon the road surface, grade, and whether or not a trailer which is often employed is used. The N.A.G., which makes one of the best known bus chassis, employs a valve-in-head engine, from which the valves can be removed without dismantling when grinding is required.

Most of the new bus chassis have electric starting and lighting systems. To facilitate starting in cold weather the Buessing buses are fitted with a primary device operated from the dash and arranged to feed each cylinder with a rich mixture. Mannesmann-Mulag buses are provided with a special carbureter shown in Figs. 1 and 2. The choke A is raised by the lever B in starting.

This gives a high velocity air stream over the jet, thus helping to produce a good mixture for starting purposes. As soon as the start is made the choke is lowered to the position shown in Fig. 1. The N.A.G. bus has hand controls on the steering column for regulating the water temperature by opening and closing the water outlet of the radiator and the air temperature by regulating a valve which

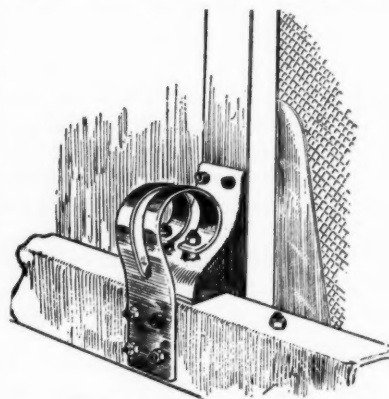


Fig. 3—Flexible radiator support used on the Adler bus chassis

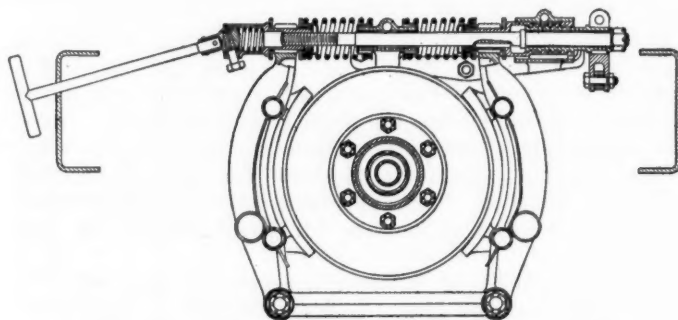


Fig. 5—Propeller shaft foot brake employed by Buessing has convenient hand adjustment projecting through side of frame, and special means for lubricating the brake spindle shaft

controls the quantity of heat added to the air entering the carburetor. A thermometer on the radiator cap is employed to guide the operator in adjusting these controls.

Most buses are fitted with radiators having easily replaceable sectional cores. In some cases the radiators are provided with a flexible support such as that used on the Adler bus, Fig. 3.

Inasmuch as most buses are operated a large proportion of the time on light loads, it is desirable to use some means for increasing economy at these loads. This is accomplished in a new gearset employed on the N.A.G. chassis, which is shown diagrammatically in Fig. 4. This gearset is provided with the usual four speeds and the constant mesh gears *A* and *B*. It is also fitted with a second set of gears *C* and *D* which when engaged become the constant mesh set. Gear *D* is operated by a separate change speed lever. When *C* and *D* are engaged there is less total reduction, and three higher speed gears than were possible with gears *A* and *B* in mesh are made available. This results in a better load factor and in decreasing the engine speed or increasing the speed of average bus operation with corresponding decrease in fuel consumption and in running time over a given distance.

In order to realize the largest possible saving in fuel when solid tires are employed, the gear ratios are so arranged that the engine speed is reduced about 30 per

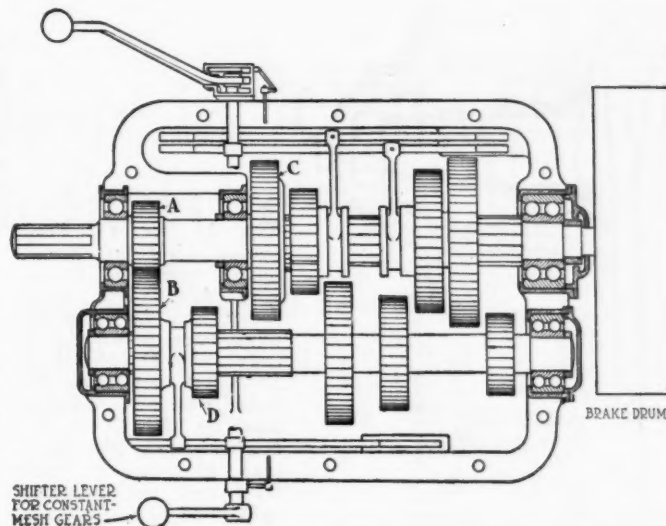


Fig. 4—Diagram of new type of gearset employed in N. A. G. bus chassis

cent by use of the constant mesh gears. When pneumatics are employed the engine speed is maintained the same as before, while the bus speed is increased. This over-gear arrangement is said to be equivalent to the use of a two-

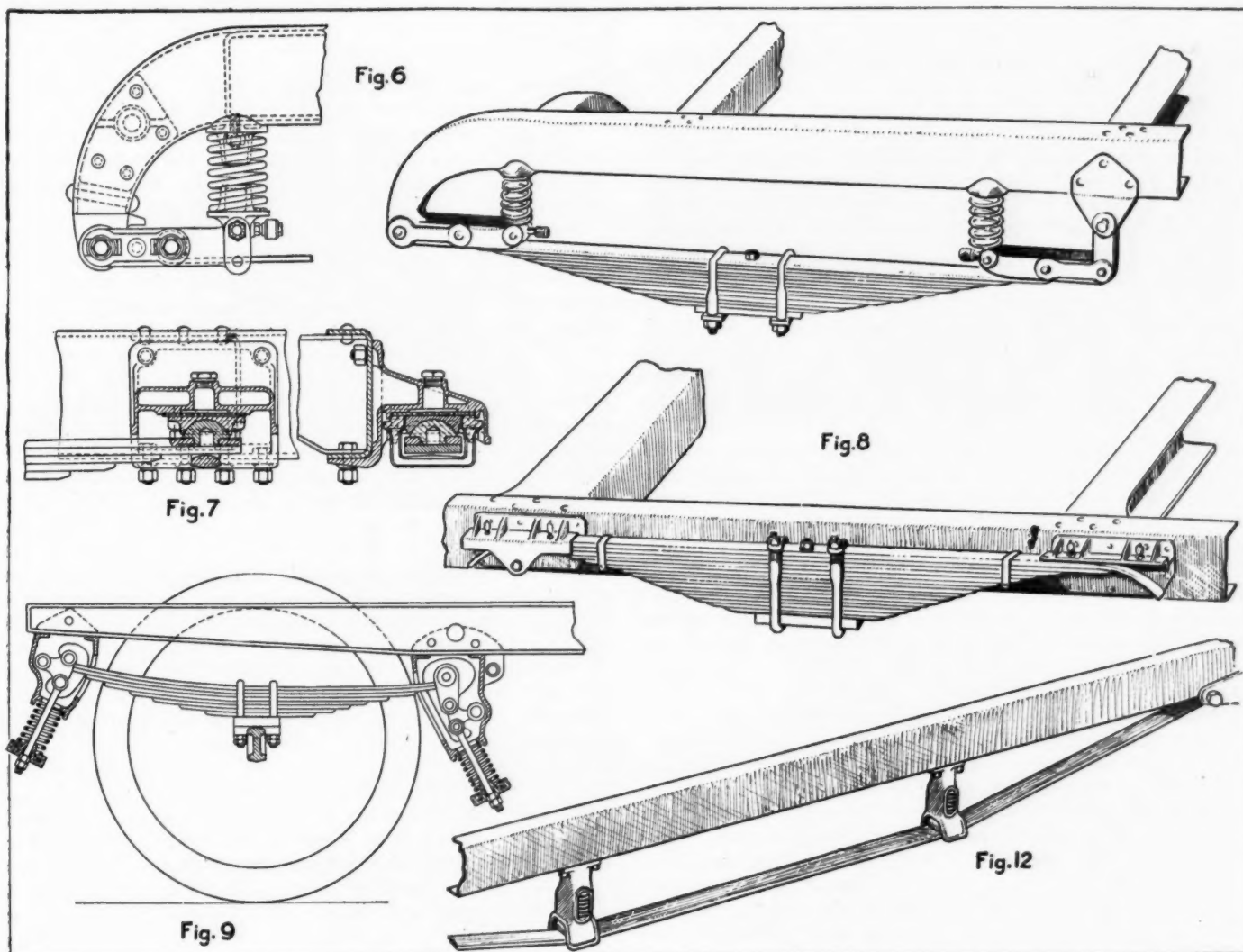


Fig. 6—Front spring suspension used on Buessing chassis. Fig. 7—Spring with sliding end plate used in the Buessing bus. Fig. 8—Rear spring employed by N. A. G. It requires no shackles and its effective length decreases with increase in load, thus improving the riding qualities at all loads. Fig. 9—Spring construction employed on rear of Mannesmann-Mulag buses. The helical springs care for light loads. The leaf spring becomes effective when the load is increased. Fig. 12—Method of trussing employed on the Mannesmann-Mulag bus frame

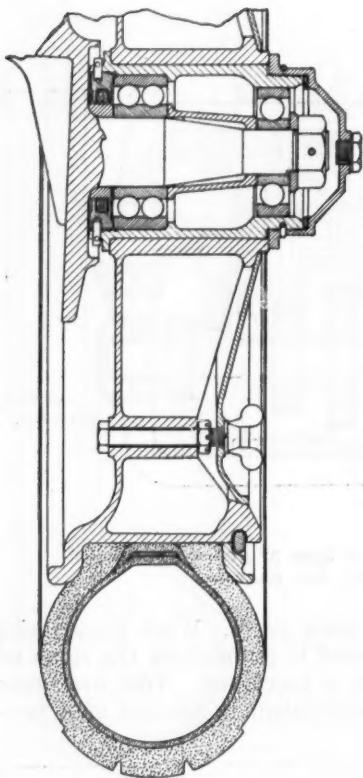
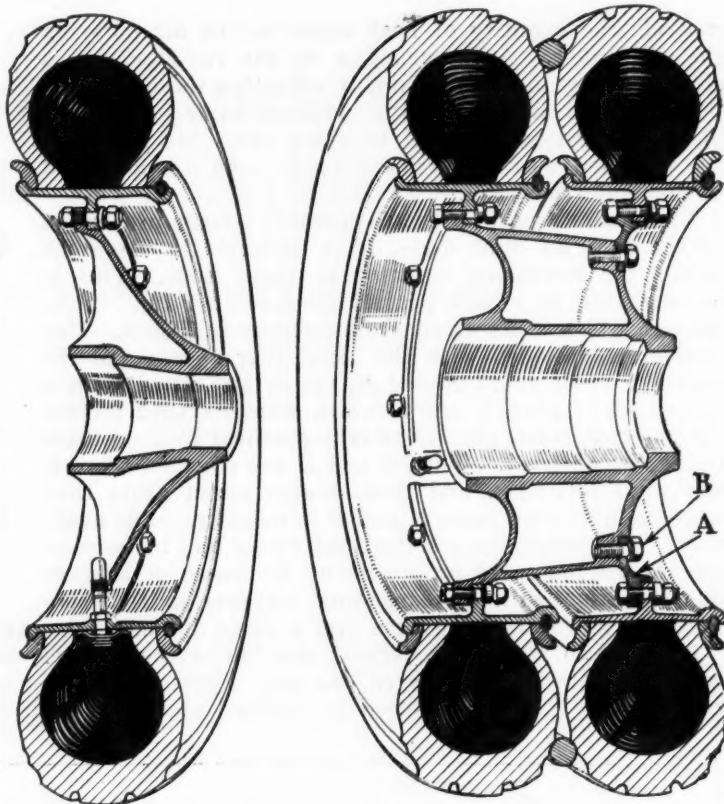


Fig. 10 (left) — Sectional view of front wheel used on Buessing bus. The dust cover, held in place by wing nuts, is of aluminum. Fig. 11 (right) — Sectional views through front and rear wheels used on the N. A. G. bus chassis. The central portion is cast steel and the detachable rims are of aluminum



speed axle, but is less expensive and involves no increase in unsprung weight.

In truck chassis the correct adjustment of brakes is of great importance. The propeller shaft brake is very generally used and some special convenient means of adjustment is employed in some cases. The Buessing, for example, use the brake construction shown in Fig. 5, in which adjustment is facilitated by a rod with a handle projecting through the frame side member. This rod is connected by ball joint to the brake spindle.

Many firms who furnish buses with solid tires employ the same half-elliptic spring arrangement used on truck chassis. If, however, pneumatic tires are furnished the rear springs are raised considerably. Many efforts have also been made to improve the riding qualities of buses. An example of this is shown in Fig. 6, in which each front spring is fitted with two additional supplementary helical springs, arranged in such a manner that the supplementary springs carry only half the load resting on the main spring eye-bolt. In the Buessing bus only the rear end of the front spring is provided with the usual eye-bolt, while the front end is arranged to slide as in the case of the rear spring illustrated in Fig. 7. It will be noted that a ball segment is riveted to the end of the main spring leaf. This segment rests in a corresponding seat or recessed block to which it is loosely attached. The upper face of the block is flat and is arranged to slide over a corresponding surface attached to the frame bracket. This surface is dust tight and well lubricated. The ball surface is said to require only the usual coating of grease and graphite when the springs are assembled.

Inasmuch as rear springs are a controlling factor, so far as the comfort of passengers is concerned, many efforts have been made to improve their riding qualities. A construction somewhat similar to Buessing is employed by N.A.G. This bus is provided with rear springs in which the ends of the main leaf are bent downward and rest in side brackets of the frame member as shown in Fig. 8. This construction has the added advantage of decreased spring length as the load increases, a factor which improves riding qualities both when the bus is riding light and when loaded. When the bus is light the

effective length of the springs is said to be 56 in. Fully loaded, their effective length is about 43 in.

The rear springs used by Mannesmann-Mulag are shown in Fig. 9. This is so arranged that the helical springs take most of the deflection at light loads, while at heavier loads the leaf spring becomes the more effective.

Most German bus chassis are now fitted with giant pneumatic tires and the cast steel wheels are quite generally replaced by lighter and more resilient disk wheels. In some cases, such as the Buessing bus, it is the practice to mount an engine driven air compressor in the chassis and to use no quick detachable rim, while other designers, such as N.A.G., contend that complication is avoided by eliminating the air compressor and providing spare tires with quick detachable rims. A sectional view of the front wheel used on the Buessing bus is shown in Fig. 10. This is provided with aluminum dust cover held in place by wing nuts. Axial thrust is taken by a bronze sleeve.

Fig. 11 shows sectional views through the front and rear wheels used by N.A.G. The central portion of the hub is cast steel, on the outside of which a detachable rim of aluminum is mounted. This has a T-section, the flange being fastened with bolts to the central portion of the wheels. In the case of the rear wheel the inner tire can be dismantled after removing the outer tire with the rim and ring A after loosening rim bolts B. The ball bearings of the front wheel hubs are so arranged that the wheel can be taken off without special tools.

The frames of German bus chassis are usually longer than those employed for truck purposes and a longer wheelbase, together with a wider tread, is quite general. To avoid the use of a heavy frame which would otherwise be required the Mannesmann-Mulag bus is provided with the truss shown in Fig. 12. This truss is made from strip steel arranged with the helical springs carried in sockets attached to the side member as shown. This arrangement is said to avoid frame breakage and at the same time provide a desirable degree of resiliency.

The Vomag Co. avoids the use of an unusually long wheelbase by placing the driver's seat beside the engine, thus giving additional space for passenger seats.

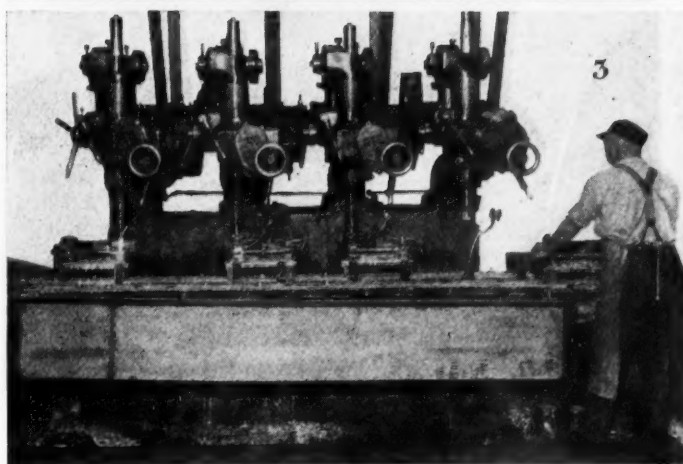
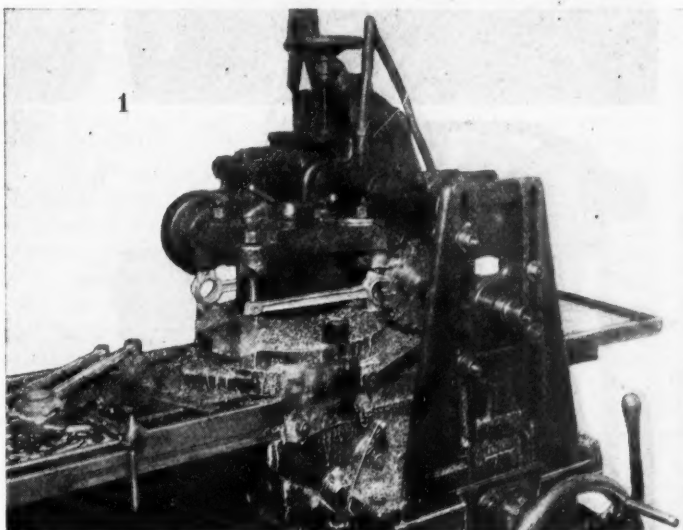
Economy and Precision in Connecting Rod Manufacture

Machining operations in finishing Hupmobile rods are described. Great care is exercised in assuring parallel axles for wristpin and big-end holes, most operations being located by mandrels through these holes. Several of the machines used run continuously.

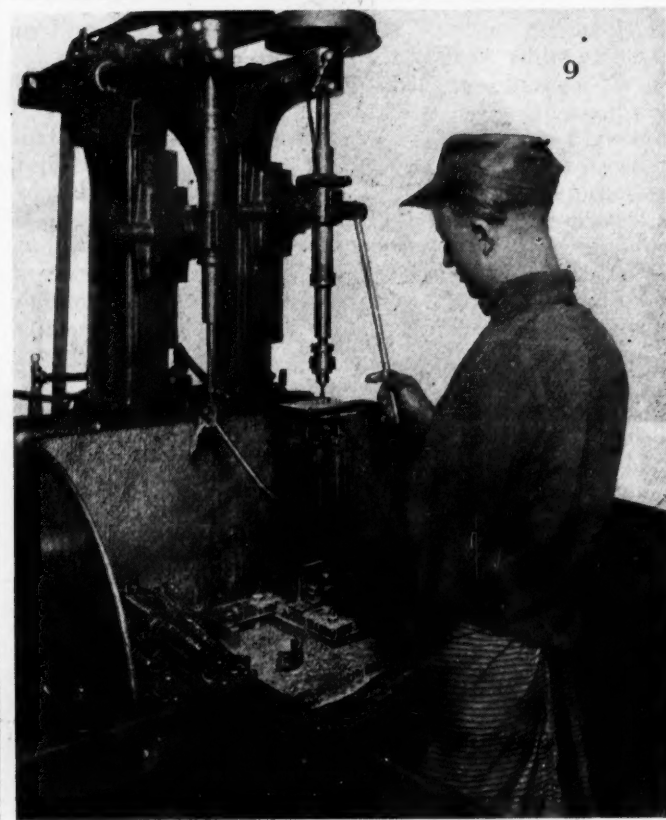
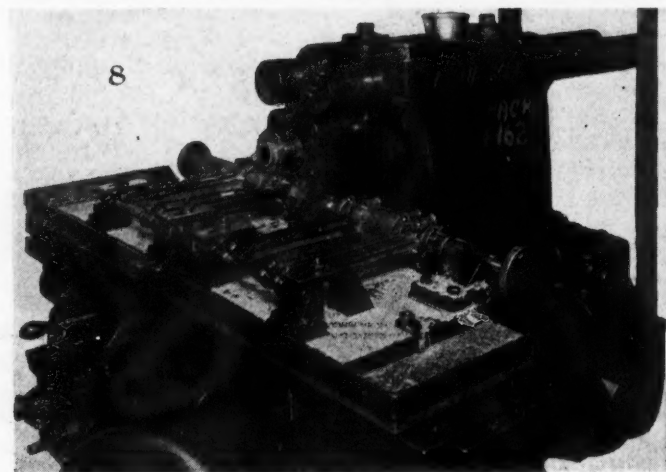
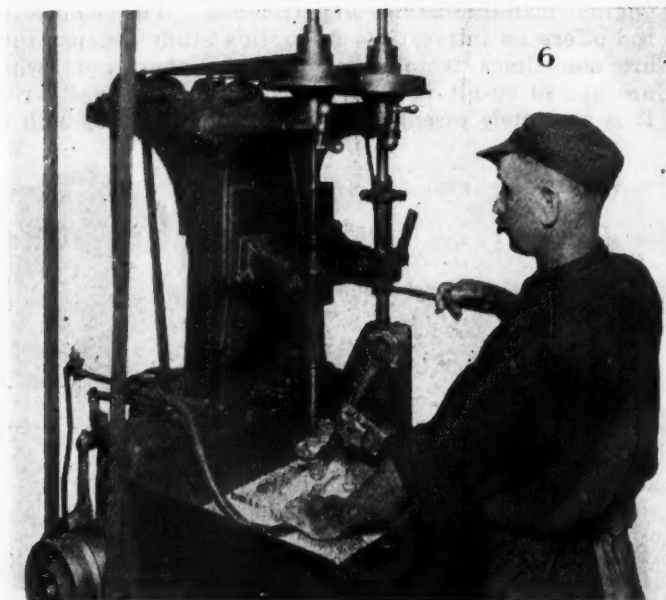
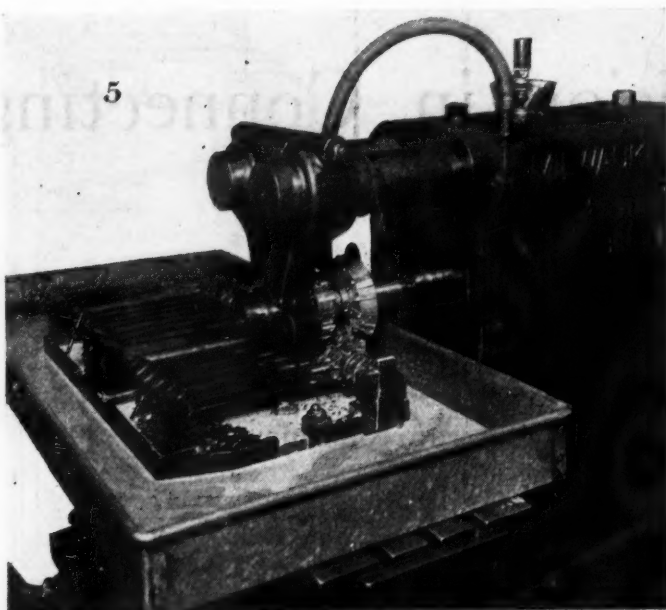
By J. Edward Schipper

CONNECTING rod manufacture, as has been frequently pointed out in these pages, offers some very interesting problems. Engine makers realize the importance of carefully laying out operations for connecting rods, not only with the idea of getting the best possible rod for the least expenditure of time and effort,

but also to make this department tune up with the other engine manufacturing departments. The connecting rod offers an interesting production study because there are sometimes temptations to make short cuts which are apt to result in a large percentage of faulty rods. It is absolutely essential that the center lines of both the



1—Straddle milling ends of rods to fix width. Note the indexing fixture which permits rod to be swung around. This is a Brown & Sharpe mill. 2—Straightening Hupp connecting rods after primary milling operation and before machining. Note inspection gage. 3—Four-headed Colburn drill which drills and reams wrist pin and large bearing hole on same jig. Note rails for jig permitting them to be rolled from spindle to spindle and back again. 4—Broaching small and large ends of connecting rod simultaneously on LaPointe broaching machine. This is a self-centering operation.



5—Six rods are put through at the same time on a Milwaukee miller which faces the bearing cap bolt hole bosses. The rods are loaded in one fixture while the other is in operation, allowing the machine to work continuously. 6—Allen radial machine drilling angular holes through piston pin bolt hole boss. 7—Fox drill press which drills two rods and reams two rods at the same time, permitting another four rods to be loaded while the operation is taking place. This is a very effective machine and works sufficiently rapidly and efficiently to permit the operator to handle another operation as well. 8—Splitting the bearing caps on Milwaukee miller. This is handled by the same operator who takes care of the drilling and reaming shown in Fig. 7. 9—Two Allen drills take care of the dowel pin holes in the caps and also chamfer the bolt holes in the bearing boss. The Magic chuck permits of rapid change from the drill to the reamer

upper and lower bearings be parallel. No twist or bend can exist in rods if a perfect performance is desired.

When a twisted or eccentric rod is put in a gasoline engine it means that the piston, for at least a part of its stroke, is going to be cocked in the bore. This results in rapid ring wear and also rapid wear of the ring grooves. If the case is a bad one, it is apt to result in scored cylinders. It is essential to maintain absolute parallelism of the center lines of the two bearings.

In the following description of the operations on the Hupmobile connecting rod, this point should be borne in mind. It will be particularly noted that bending or strengthening of the rod occurs early in the operation and that after the rod has been straightened and the preliminary operations have been carried out, location for further machine work is based on the centering of both the upper and lower bearings. Instead of using a single mandrel and a V-block, as is customary in some shops, these rods are located on two mandrels which pass through the upper and lower bearing openings, so that the rod will not go in the fixture unless it is true. Also, because of this method of location, it is practically impossible for machining operations to distort the rod.

Straddle Milling Bearing Caps

The Hupp connecting rod has a clamp bolt through a split boss at the wrist pin bearing. The first operation on the rod is to straddle mill the bearing cap and the wrist pin cap, Fig. 1. This is accomplished on a Brown & Sharpe mill, two rods being handled at a time. The forgings are located from the wrist pin bolt hole boss and from the bearing cap bolt hole bosses for this operation. The lower ends of the rods are handled together and the upper ends similarly. This is accomplished by utilizing a revolving indexing fixture. This operation fixes the width of the rod. The work is checked on a snap gage and is held to .0001 in. limit.

With the width of the rod fixed, the straightening operation is performed. This is done by hand in a vise, Fig. 2, and checked by a gauge which shows whether there is any twist in the rod. The same operator who is checking the rods also center punches over and under the bearing cap joint so that when it is finally cut off, the cap is put back in the same way as it is taken off.

After the straightening operation, the rods are passed to a Colburn drill with four heads. The jigs holding the rods operate on tracks under the drill heads, Fig. 3. They are passed from operation to operation until they are finally completed, after which they are switched back on an outside track. The first operation on the Colburn drill is on the wrist pin hole. This is a drilling operation. The second and third operations are to rough drill and semi-finish drill the big end bearing while the fourth is a finish reaming operation on this same bearing. Location is from two set screws against the lower end of the rod. This end lies against a bushing and the two set screws set against the lower end. A clamp screw at the upper end of the rod pushes the rod back against the set screws at the big end. A clamp in the center of the rod holds it firmly in position. A connecting rod goes through all four of these drilling and reaming operations in $1\frac{1}{4}$ min., two operators being used.

The last man on the Colburn drill also gages with a go and no-go gage the holes at the upper and lower end of the bearing. The go-gage is .849 and the no-go, .851 in. On the big end the go-gage is 2.042 in. and the no-go, 2.048 in.

The rods are now ready to be broached, this operation being performed on a La Pointe machine. Both ends of the rods are broached at the same time. The average time on these is one rod per minute. The broaching op-

eration is self-centering and requires no close locating arrangements, Fig. 4. This operation establishes the two bearing holes, and following this all of the operations are located from the two holes on arbors. The care used in the establishment of the big end bearing openings may be noted when it is remembered that this hole was first rough drilled, then semi-finish drilled, finish reamed and finally broached. After the broaching operation, the big opening must be between 2.060 and .062 in., these being the dimensions on the go and no-go gages.

A Milwaukee miller is employed for facing the bearing cap bolt hole bosses, Fig. 5. This is a straddle operation, six rods being put through at a time. These rods are mounted on two arbors passing through the upper and lower ends. The arbors rest in V-blocks on a fixture. Two of these fixtures are employed, making it possible to load one while the other is running. This permits the milling machine to keep running all the time, and it is cutting practically all the time, the only gap being between the two fixtures when a small interval of time occurs between the finishing of one fixture load and the beginning of the operations on the next six rods on the fixture which has just been loaded.

With this arrangement, the operator has time also to take care of the operation of drilling the wrist pin bolt holes through the boss. This is a compound drilling operation, two drills being used on the same machine. There is a $21/64$ -in. hole which goes all the way through and a $13/32$ -in. hole which goes half-way through, the bolt employed being a step bolt. The machine used is an Allen radial. The fixture has the usual two arbors for both ends of the connecting rod, Fig. 6.

Continuous Drilling and Reaming

The holes for the bearing cap bolts are drilled on a Fox press. This is another case in which the machine is kept running continuously. Two of the rods are drilled and two reamed at the same time. An indexing fixture is used for the work, and, as the illustration in Fig. 7 shows, the machine is being loaded and is drilling and reaming at the same time. This is a very effective machine, for it not only handles this work very rapidly, but also allows the operator sufficient time to take care of the splitting operation on the wrist pin boss. This is done on a Milwaukee miller, Fig. 8. The holes in the bearing cap bolts are held so that they will check on a .436 go and .438 on a no-go gage. Location is as usual on two arbors in this and in the splitting operation.

The bolt hole boss is tapped with a $3/8$ -in. 24 tap for the wrist pin bolts. This is handled on a Strong Carlisle radial. The bearing caps are split from the rod on a Milwaukee miller which loads four and cuts four at the same time. The rod is located on two arbors and clamped.

Two Allen drills take care of the dowel pin holes in the caps and also chamfer the bolt holes in the bearing boss, Fig. 9. This same machine takes care of both the drilling and reaming operation on the dowel holes, a magic chuck being employed to make the change over from drill to reamer. The drill is a $15/64$ -in. drill and the reamer a $1/4$ -in. The machine handles 70 per hr.

The final operation on the rods is a hand trimming or filing to remove burrs. The rods then go to a bench, where they are given a thorough final inspection before being sent to the babbitting department. The cap belonging to each rod is wired to the rod itself so that the same cap which was cut off the lower end of the rod is returned to the rod on assembly. The center punch mark, as previously described, enables the assemblers to put the cap on in the correct way.

These operations give an economically manufactured yet accurate rod.

Fractional Distillations of Fuel and How to Make Them

It is said to be impossible to secure consistently comparable results with present standard apparatus. The desirable characteristics of satisfactory apparatus are herewith developed and a new type of still which fulfills these requirements is described in detail.

By P. S. Tice *

THE automotive industry has by now definitely set aside its Baume hydrometers and is using stills, as prescribed and directed, to classify and compare its fuels. But in spite of this state of affairs, to the attainment of which much effort has been expended, it is rumored about that distillation tests of fuels are, after all, of comparatively little value. It will have to be acknowledged that there is much justification for this opinion of the average distillation data. Most of it is highly misleading because of its failure of even approximate truth on points of great import to the user of engine fuels.

Why results of questionable value are obtained in the execution of an excellent general method is a matter that will bear some looking into.

Taking precedence even of the matter of cost of a fuel, the item of interest and importance is its volatility or, in the usual case, its range of volatilities. Information on this point can be obtained only by fractional distillation; and recognition of this fact explains the active campaign instituted some time ago to make the distillation test a standard method of fuel examination. In the abstract there is everything to be said for it, and nothing of any importance to be said against it; hence its present universal adoption.

A GREAT mistake was made in placing the stamp of approval upon an apparatus quite unsuitable for the purpose in hand, even though a reason of expediency probably accounts for what was done in this direction. The industry was asked to substitute a relatively intricate and tedious operation for a very simple one—to substitute for the familiar hydrometer a still with its heater, thermometer, condenser and receiver. No doubt the idea was to make the apparatus as elemental as possible, to the end that the method might meet with the less resistance. It is certain that no like considerations now have weight. The aim should be to make the most of the knowledge available, and to extend both the scope and accuracy of that knowledge. In every branch tools of new design continuously supplant older and simpler ones because they do finer work more expeditiously and more nearly automatically.

Any petroleum analyst will agree that a fractionation of a petroleum fuel is not to be undertaken loosely and with elemental apparatus, if the results are intended to

convey useful information. Certain precautions and features of apparatus design must be included or the work might almost as well be left undone.

What Fractionation Can Tell

A FRACTIONATION of any one of our commercial engine fuels can and should yield data from which can be plotted and deduced:

- (a) Truthful relations between temperature and percentage of distillate;
- (b) A closely approximate statement of the boiling points of the majority of components of the fuel (with some additional knowledge of the fuel this amounts to the same thing as naming the components themselves);
- (c) A reasonably close estimate of the proportions of the several components present in excess of three per cent;
- (d) A general recognition of the presence of substances occurring in quantities of not less than one per cent.

Interpretation of these data in the light of a general knowledge of vaporization and combustion characteristics of petroleum fuel substances give practically all the information needed for the purposes of classification.

As distinguished from the comparatively open book that fractionation can place at our service, the present standardly used method of distillation results in: (1) initial point values that are anywhere up to 40 deg. C. (72 deg. F.) too high; (2) end points that are too low by a like amount, and (3) no direct recognition of any one of the substances present, and hence nothing on which to base estimates of the characters of the substances or the extents of occurrence. Added to this is the deplorable fact that two men using identical standard apparatus cannot consistently check each other with identical fuel samples. A highly skilled chemist, who makes periodic distillation tests as a matter of routine, states that he despairs of getting reasonably close checks on repeat distillations.

These are the points that need looking into, to the end that the easily realizable possibilities of fuel fractionation may be understood and put to work.

In order to clarify the discussion of apparatus design details that must of necessity be brought in, the following description of fractionation is inserted:

When a mixture of different liquid substances, such as any of the usual engine fuels, is placed in a distilling flask and heated, boiling occurs as soon as the temperature is raised to a value at which the vapor pressure

* Engineer directing Carbureter Division, Stewart-Warner Speedometer Corporation.

of the mixture is equal to the atmospheric pressure. The vapor evolved saturates the space above the liquid and then passes into the neck of the flask. The latter is at a lower temperature than the liquid in the flask bulb or the vapors driven off from it, because of its exposure and remoteness from the source of heat.

Some of the vapors coming into contact with the wall of the neck are condensed upon it, and the condensate runs back toward the bulb. This condensation is the first important step in the process of fractionation; and the extent and therefore the truthfulness and value of the analysis depends wholly upon what happens subsequently in the condensate and in the column of vapor moving in opposition to it.

As it leaves the surface of the liquid a volume of vapor contains representatives of each of the substances comprising the mixture in the flask, in quantities approximately proportional to the vapor pressures of those substances at the temperature of the liquid. Since at any temperature the vapor pressure is greater the more volatile the substance, it is clear that the more volatile substances have the greater quantitative representation in a volume of vapor. This explains why the evolved vapors are richer in the more volatile substances than is the liquid left behind.

Immediately upon leaving the surface of the liquid, and all along their further course, the vapors are subjected to progressive cooling; and, since they are saturated vapors, this results in progressive partial condensation. But while all of the substances comprising the vapor mass contribute to the condensates thus formed, the less volatile are condensed relatively more extensively than the more volatile, because of their respective vapor-pressure-vs.-temperature relationships. Thus it is that as unit volume of vapor passes away from the boiling liquid it: (1) progressively loses by condensation greater and greater proportions of its less volatile constituents; and (2) progressively includes more and more of the substances of greater volatility. Item (2) follows from the fact that the total pressure in the column of vapor is unaffected by the condensations.

But the vapor column has been moving continuously outward from the bulb while these condensates were forming, with the result that there is a volatility gradient in the vapors along the length of the neck, the more volatile substances preponderating higher in the passage. And the same sort of gradient, in the same direction, exists in condensates on the walls of the neck.

SINCE the condensate forms and accumulates toward the bottom of the neck more than at the top, and because the vapors are hotter when they first enter the neck than when the survivors reach the top, there is also a temperature gradient along the flask neck. The heat represented in this temperature gradient subjects the descending condensates to a progressive partial revaporization which drives back into the vapor phase portions of the substances comprising the condensate. The same conditions apply here as noted for the original evaporation in the bulb of the flask, i.e., the evolved vapors are richer in the more volatile constituents than is the liquid

left behind. But there are distinctions to be drawn between the effective fractionating values of the initial vaporization in the bulb and revaporization of condensates in the neck of the flask: (1) the latter takes place from a liquid mass that is richer in the more volatile components, hence the relative purification is greater than that occurring in the bulb; and (2) partial revaporization of the condensate is accomplished under conditions that preclude the possibility of superheating, and takes place at lower temperatures because of the sensibly different composition of the liquid; thus the partial pressures of the less volatile substances included in the condensate are relatively lower and contribute less to the total vapor pressure, than in the case of vaporization in the directly heated bulb.

Requirements for Close Fractionation

TO secure the extensive fractionation of a petroleum fuel mixture, the two steps in the process, partial condensation and partial revaporization, must be repeated very many times and under conditions that promote the most intimate contact possible between rising vapors and descending condensates. Of the two steps that of revaporization is the more effective, particularly if it is handled with sufficient delicacy and in proper environment.

A most important consideration in treatment of the condensates is that they shall descend at rates and in paths such as to effect complete heat interchange with the rising vapors. This presupposes that at any level in the neck or still head there is a minimum and heterogeneous temperature gradient. To state the case negatively, there must not be on the wall of the still head a rapidly descending

and comparatively cool sheath of condensate surrounding a freely ascending core of hot vapors.

A further point of prime importance is the momentary relation between the temperature of the still head and that of the vapors passing through it. If the still head is relatively too hot, fractionation is reduced because insufficient condensate forms to give a material purification of the vapors; and also the benefits of revaporization of condensate are largely lost because of its meager quantity and unfavorable composition. If the still head is relatively too cool compared with the vapor temperatures, too much condensate forms in relation to the mass of the vapor column, thus minimizing revaporization and causing the return of too much of the more volatile constituents to the still.

Since the relative temperature of the still head controls both the rates of condensation of the vapors and the rates of revaporization of the condensates, it appears that its careful regulation is one of the most important single items in the process.

Enough description and discussion have been offered up to this point to justify the immediate enumeration of general design essentials of a highly fractionating distilling outfit:

- (1) Close and consistent regulation of the temperature of the still head walls.
- (2) Intimate thermal contact between vapors and condensates.

AS distinguished from the comparatively open book that fractionation can place at our service, the present standardly used method of distillation results in the recording of too high initial points and end points that are too low by a like amount.

It is a deplorable fact that two men using identical standard apparatus cannot consistently check each other with identical fuel samples. A skilled chemist states that he despairs of getting reasonably close checks on repeat distillations.

These are the points that need looking into, to the end that the easily realizable possibilities of fuel fractionation may be understood and put to work.

- (3) Minimum temperature gradient across still head section at any level.
- (4) Sufficient space and time intervals between still and side tube.

These features, as well as the several other more widely recognized and more perfectly embodied ones, are capable of easy and simple realization in practice.

OF the great number of still head types and forms from which choice can be made, there is only one, the Hempel,¹ inherently embodying an approach to still head temperature regulation by controlled means. In this form the greater part of the passage is filled with beads—elipsoidal aluminum beads according to Bureau of Mines suggestion. This gives the still head a mass and heat capacity not possessed by any of the others, thus largely protecting its contents from wide accidental temperature fluctuations. The result is that the head is a comparatively efficient fractionator.

But while the Hempel head possesses the advantage of a considerable heat inertia, and also satisfies item (2) in considerable measure, it falls far short of the highest possible realization of the first two essentials. Much

¹For a general discussion of fractional distillation and the experimental examinations of a great number of still heads, see Sydney Young's "Fractional Distillation" and U. S. Bureau of Mines Bulletin No. 125, "The Analytical Distillation of Petroleum," by Rittman and Dean.

more condensate is always found at the walls than in the bead interstices along the axis. And while thermal contacts between condensate and beads are good, those between beads are quite imperfect. Thus item (3) is very incompletely satisfied. This, taken together with the always exceptionally large amounts of condensate compared with the vapor mass, brings the fractionating efficiency well below that attainable.

The reason for discussing the Hempel still head at this length is that it is easily the best of all the fractionating apparatus obtainable in the market to-day, considering its efficiency together with its simplicity, ruggedness and cost.

None the less, no great sacrifice of simplicity, and only unimportant increase in cost of apparatus need be endured to make great gains in fractionating efficiency and ruggedness, to say nothing of greater convenience, automaticity and foolproof qualities in manipulation. The two qualities last named are obviously of the greatest importance in commercially used apparatus and are realized to negligible extents in the operation of any of the usual set-ups.

A Specially Designed Fuel Still

IN 1916 the writer became keenly interested in the present subject, and, after considerable experimenting with available apparatus, designed and built the fractionating unit shown in Fig. 1. The idea back of the design was to secure the greatest possible fractionation in a single run. If the efficiency in this direction could be made great enough, a single run would yield all the information needed for ordinary purposes, and it would become unnecessary to make the usual very intricate and troublesome redistillations of primary fractions. It was recognized that the most useful apparatus would have to be a completely self contained unit, practically non-breakable, always set up, easy to handle, closely but almost automatically regulable, and at the same time free from disturbance by outside influences.

Referring to the views of the apparatus, the still is a 200 cc. Pyrex flask mounted in a fitting which seats upon a lead gasket to make the joint with the still head. Boiling of the still liquid is caused by passing 110 volt current, under external resistance control, through a small coil of Nichrome wire immersed in the liquid and in contact with the bottom of the flask. Surrounding the still flask is a readily removable shield which protects it from air currents.

The still head is made up of copper spinings, silver

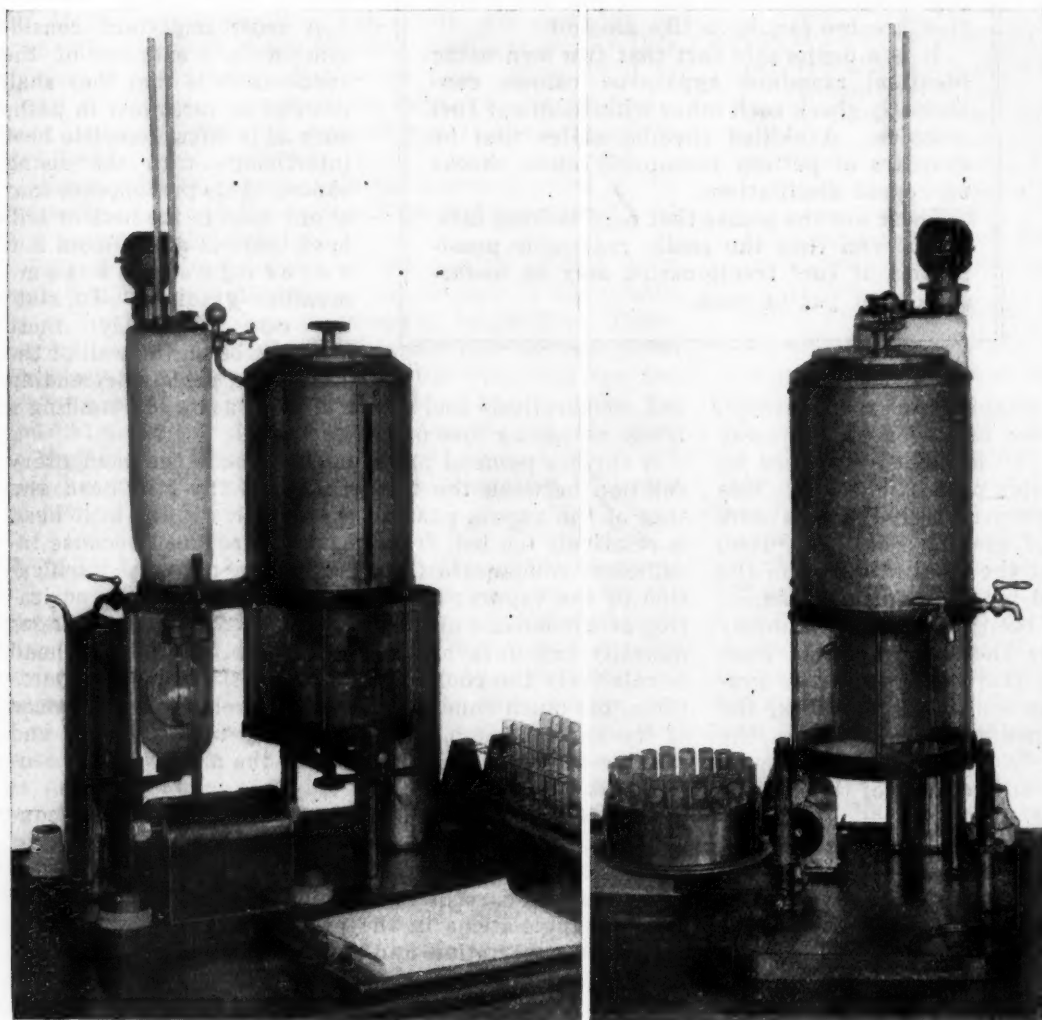


Fig. 1—The special self contained distilling apparatus built by the author in 1916. The important features are a highly efficient fractionating still head, close and nearly automatic regulation of the still head temperature, complete protection from disturbance by outside influences, and a high degree of convenience in manipulation. Repeat distillations in this apparatus check each other within plus or minus one per cent (cumulative) throughout the distilling range

soldered together, and is a modification of the well known "pear" head, so arranged, see Fig. 2, that the rising vapors thoroughly scrub small amounts of condensate in each section.² There are twelve sections or chambers having a total height of 12 in., including the upper elongated one in which the still head thermometer is mounted.

An oil jacket which surrounds the still head, is provided with a controlled electric heater unit at its base, and has a large return tube at one side in which a propeller is driven by a stirring motor. A thermometer having its bulb immersed in the oil of the jacket stands beside the still head thermometer.

At the top of the still head is a fitting including a shut-off needle valve and a manometer connection for use in vacuum distillations. The vapor down-flow tube is joined to the still head fitting by a union and is soldered to the condenser tube. The latter is quite short (16 in. of 5/16 in. o.d. copper tube), is zig-zagged instead of coiled, and passes steeply down through a condenser chamber provided with a heavy heat insulating lagging. The condenser chamber, which is also provided with a heater and a thermometer, is continued at reduced diameter well below the level of the condenser tube outlet, for the purpose of providing cooling for the distillate receivers.

THERE is capacity in the receiver carrier for twenty tubes; and the carrier is rotated to change receivers, as required, by turning a large knob at the top of the condenser chamber. A spring-pressed ball engages its notches in the carrier spindle boss for positive location of the receivers under the condenser tube outlet. The whole receiver carrier, together with the bottom cover or sealing plate of the glass enclosed chamber housing the receivers, slides vertically downward upon release of a spring catch, and can then be swung around to the front for charging with receivers or changing them. The glass walled chamber can be made up air tight, as for vacuum distillation, when the carrier is in position; and the pressure is then reduced as desired by connection with a pump. In ordinary distillation this pump connection is left open, venting the apparatus to the atmosphere.

At the base of the still head, at the front, is a combination cock and funnel for use in refractionation of primary distillates. With the handle up the still is sealed. To introduce a fraction for redistillation, the tube containing it has slipped over its open end a stopper which fits the funnel. The tube and its stopper are engaged tightly in the funnel while the latter is inverted; then a half-turn of the handle introduces the primary fraction to the still with negligible loss. For redistillation of fractions the 200 cc. still is removed and in its place is mounted a Pyrex test tube of about 40 cc. capacity.

² The writer is about to build in a modification of Sydney Young's "evaporator" still head, shown in Fig. 3, which possesses several features of important advantage over the form shown in Fig. 2, as well as compared with Young's original form. The head of Fig. 3 is also made of metal, silver soldered together, each section being 3/4 in. long. Young's sections were made in glass, and ranged from 3 to 5 in. in length each. The important advance here made is that the condensates have minimum duration of contact with the outer cooled wall of the still head; and once condensate has drained down from the outer wall in any section it never again comes into contact with an outer wall (in the liquid state), but is continuously spread over the hotter interior surfaces that are swept by the vapors. Revaporization goes on at a very high rate, the condensates actively boiling on the top surface of each of the inverted cups, as seen in the experimental development when metal "evaporator" sections were packed into a glass still head tube. Great practical advantages of this head are: (1) that it is impossible to block it, since the up flow of vapor does not interfere with the down flow of condensate, thus permitting high distilling rates; and (2) a distilling rate up to 250 drops per minute with a nine section head and 100 gr. of fuel does not materially reduce the fractionating efficiency, as compared with the more usual 90 to 120 drops per minute.

³ Where the receiver is out in the open room, as is usual, it is obviously impossible to saturate the space in which it stands.

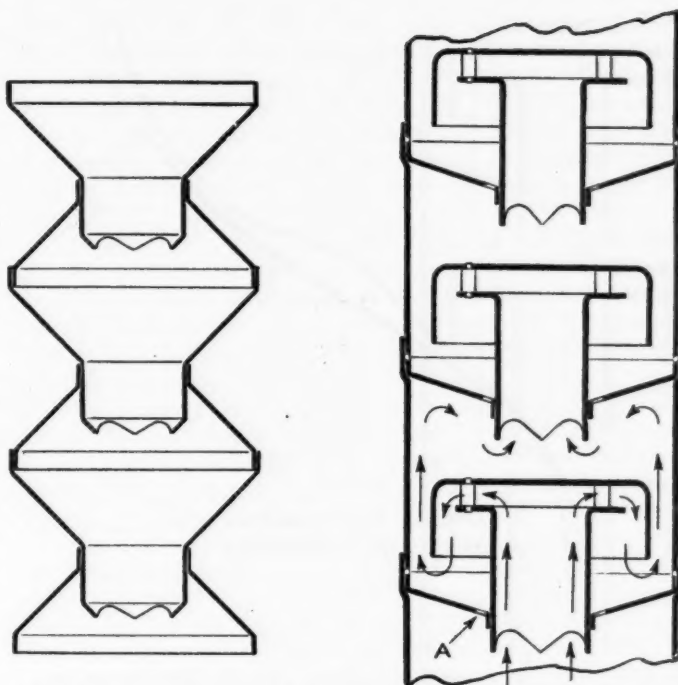


Fig. 2 (left)—The modified "pear" still head originally built into the apparatus of Fig. 1. Fig. 3 (right)—Sydney Young's "evaporator" still head as modified by the author. The condensates seal the small drain holes through which they pass and force the vapors to take the paths shown by the arrows

The whole apparatus is mounted on a cast iron base, which has locating depressions for draining vessels for condenser and still head jackets, and also carries the still and still head heater resistances, switches for stirring motor and heaters, a fuse plug and a line socket.

Operation of the Special Still

IN a distillation of gasoline the oil for the still head jacket, contained in the smaller draining vessel, is cooled to nearly 0 deg. C. (32 deg. Fahr.) by setting that vessel inside the larger one and packing ice around it. The cold oil is then poured into the still head jacket and its drain vessel set under the overflow tube of the jacket. Some 5 lb. of shaved ice and salt is put into the condenser jacket, which is then filled with cold water.

Twenty receivers are located in their carrier, and about 50 cc. of the fuel to be fractionated are poured into the bottom of the carrier. The latter is then raised into position and No. 1 receiver located under the condenser tube. Having weighed 100 grams of the fuel sample into the still flask the latter is screwed tightly into place and the run can start.

It will be noted just above that the jacket oil is considerably cooled and that a quantity of the sample is poured into the bottom of the receiver carrier. The latter is done to saturate with fuel vapors the space in which the receivers are located. If this space is not saturated³ the small amounts of very volatile fuel substance coming over as the still head temperature is raised to find the initial point will be largely lost by evaporation at the condenser tube outlet, even though they are liquefied in the condenser. This loss makes any determination of the lowest boiling constituents very problematic.

Considering a comparison of gasolines for winter use, a reasonably exact knowledge of initial points and the percentages coming over below about 40 deg. C. (104 deg. Fahr.) is of great importance, since that is the portion of the fuel which largely determines, by the extent of its presence or by its absence, whether the car starts

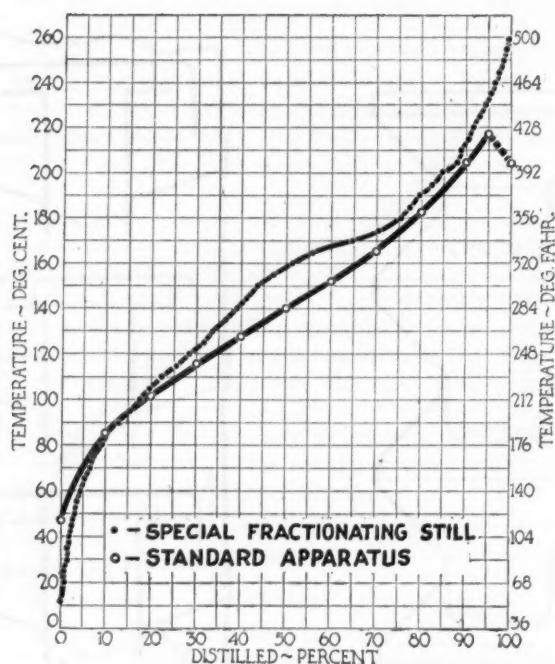


Fig. 4—A direct comparison, or conventional coordinates, of runs on the same fuel, as carried out in the standard apparatus almost universally used and in the special still described in the text. The differences are considerable and very important

easily, with difficulty, or not at all. In order that these most volatile substances may appear in the record it is necessary to start a distillation with the still head at so low a temperature that their vapors will not pass through. If the still head is at room temperature, as is usual, those substances in the fuel boiling below room temperature will be assigned grossly misplaced boiling points, for the perfectly plain reason that the still head thermometer is indicating a too high temperature when they come over. It is a fact that if our fuels really had initial points and earliest fractions as described by standard distillation tests, it would be found almost impossible to start a cold motor car engine in winter weather. The plottings of comparative distillations show the importance of getting the initial points and earliest fractions accurately into the record.

WITH everything set as above, the stirring motor is started and heat is applied to the still to induce fairly active boiling. As a rule, the still head thermometer stands higher than the jacket thermometer at this time; but they quite rapidly come to equality when the vapors enter the still head—the jacket rising very slowly and the still head dropping rapidly.

In fuels that have been available this last winter practically nothing shows up at the condenser outlet below about 10 deg. C. (50 deg. Fahr.). But in the saturated atmosphere in which this outlet is located the first drop forms very rapidly once the outlet tube shows moisture. The temperature at which the first drop falls is taken as the initial point.*

In the procedure most used with this apparatus: (1) the jacket is maintained at from 1 deg. to 3 deg. C. (1.8 to 5.4 deg. Fahr.) behind the still head; (2) the boiling is regulated to discharge distillate at an average rate of about 90 drops per minute, and (3) the receivers are shifted at each 5 deg. C. following the first drop.

*The true initial point is always well below the value found as the initial point in primary distillations of complicated mixtures. The reasons for this are discussed near the end of the paper. Specific gravity determinations made on the first distillate to appear, at from 10 deg. to 14 deg. C., show that it is probably largely butane, which boils at 1 deg. C.

It has been found that more easily interpreted data results from taking cuts at definite small temperature increments, than from doing so at certain volume increments, however small they may be. There remains a choice of method in determining how the quantity of each fraction shall be measured. Accurately graduated receiver tubes may be used, and the volumes read directly. But the preferred method is by weighing. Not only is it more accurate, but weight percentage gives a truer picture of the effective composition of a fuel, because of the usual wide range of specific gravities of the fractions. Then, too, no account need be taken of temperature in determinations by weighing. The reason for the narrow temperature increment of 5 deg. C. between cuts is that a truer differentiation between substances is obtained than would be possible with greater increments. Study of the differential plottings, Fig. 5, will make this clear.

MAINTAINING the jacket at from 1 deg. to 3 deg. C. behind the still head outlet minimizes the temperature gradients in any cross section, promotes the revaporization of condensates and keeps the quality of condensate in very favorable relation to the vapor mass, at least in the upper two-thirds of the still head. Of course the presence of the jacket completely protects the still head from accidental fluctuations of temperature, so that there are no out-of-control accelerations or retardations of the process. With the still head of metal, the jacket oil most successfully imposes its temperature upon the vapors; and carrying the whole still head at substantially the same temperature throughout its length heavily condenses the higher boiling substances as soon as they enter the head, while interfering comparatively little with the vapors of those substances boiling in the immediate neighborhood of its temperature.

Having started boiling in the still, its temperature steadily rises and steadily maintains evolution of vapor with very little attention to its heater control. And because the still vapors, directly and upon condensation, contribute to the rise of temperature of the jacket, the only attention the jacket heater requires to maintain the desired temperature relation is an occasional small reduction in the resistance in circuit, to make up for the increased heat loss from the jacket as the temperature goes up.

As the fractionation goes on an appreciable quantity of relatively pure substance accumulates in the top sections of the still head, and, as the jacket temperature rises steadily, a temperature is reached at which the greater part of this accumulation boils off very freely and passes into the condenser. While this is happening the rate of rise of the still head temperature reduces and the rate of dropping from the condenser tube increases. But as soon as this comparatively purified substance has left the still head the conditions reverse, and the still head temperature runs up quite rapidly while the rate of dropping of distillate falls off strongly, until a relatively appreciable quantity of the next higher boiling distillate is forced over by the continued rise of the jacket temperature.

No attention is paid to these momentary fluctuations in rate of rise of still head temperature, nor to the accompanying changes in rate of dropping of distillate. By this it is meant that no changes are made in the heater adjustments to compensate for them, since they are perfectly normal to the operation of the apparatus. The only attention given is to the general maintenance of the average desired temperature difference between jacket and still head and of the average desired rate of dropping.

Any fractionating apparatus has an upper limit of

distilling rate beyond which a considerable loss in efficiency of separation is experienced. There is no lower limit; but for ordinary purposes the gains from an inconveniently low rate (less than 30 to 40 drops per minute with 100 grams of fuel) are so small as to be not worth while in an efficient apparatus. For the size of sample used in the special still, the upper limit beyond which it is ordinarily undesirable to go is an average of about 120 to 140 drops per minute. At this rate the fractionating efficiency is less than at the usual average of about 90, although it is still good enough to permit a fair estimate of the proportions of the majority of the components, if it is continued to take cuts at 5 deg. C. increments.

So efficient is a single run fractionation in this apparatus,* when handled as described, that when substituting fresh receivers to carry the distillation further, only the last one of the earlier group need be left in place, and only a few additional drops discharge into it before the temperature again attains the end value for that cut.

Results Obtainable in Single Runs

INSPECTION of the curves here presented makes clear the reasons for the foregoing lengthy discussion. In Fig. 4 are compared in the conventional way the results of fractionations of the same fuel, as carried out re-

*The body of this paper is concerned with a method of distillation that will give a valuable record in the minimum time. From the very nature of the happenings in a still head having close temperature regulation, it follows that the greatest possible separation will occur with exactly equal jacket and still head temperatures and a very low rate of dropping of distillate. Furthermore, if the jacket temperature is held constant, the composition of the distillate is constant. The possibilities of the special still for truly analytical distillation are thus seen to be very great. The method of handling for maximum possible separation is to cause the jacket temperature to rise very slowly (not more than 1 deg. C. in two minutes, and to regulate the boiling in the still to keep its head temperature just equal to that of the jacket.

spectively, in the present standard set-up and in the special apparatus just described. There are several striking differences. The initial point and the appreciable percentage coming over below 40 deg. C. (104 deg. Fahr.) are shown to be entirely lost from the record in the use of the ordinary apparatus. Other important differences occur all along the line, and the very nearly true end point shown by the one curve is perhaps just vaguely suggested by the other.

The general reason for differences of this latter class is, of course, the relative degree of fractionation obtained. But the underlying reason is found in the vapor-pressure-vs.-temperature characteristics of mixtures of the sort of substances composing petroleum engine fuels. These are compounds that are, in the main, both chemically and structurally similar, and they are all infinitely miscible. Mixtures of this class of substances have boiling points intermediate between those of the pure substances, depending upon the proportions of the mixture.

If only the temperature range of distillation is sought, without regard for the quantities of material volatilizing at the several temperatures, the foregoing considerations cause distortion of the results only at the two ends of the run—the initial point will be too high and the end point too low. But it is very necessary to know the true initial and end points, as well as the percentages volatilizing between them, as has been discussed. The only recourse is to carry the relative purification as far as possible by efficient fractionation.

Differential Plottings of Fractions

THE conventional plotting of cumulative per cent-distilled-vs.-temperature, as in Fig. 4, hardly does more than show the boiling range for the fuel examined, and

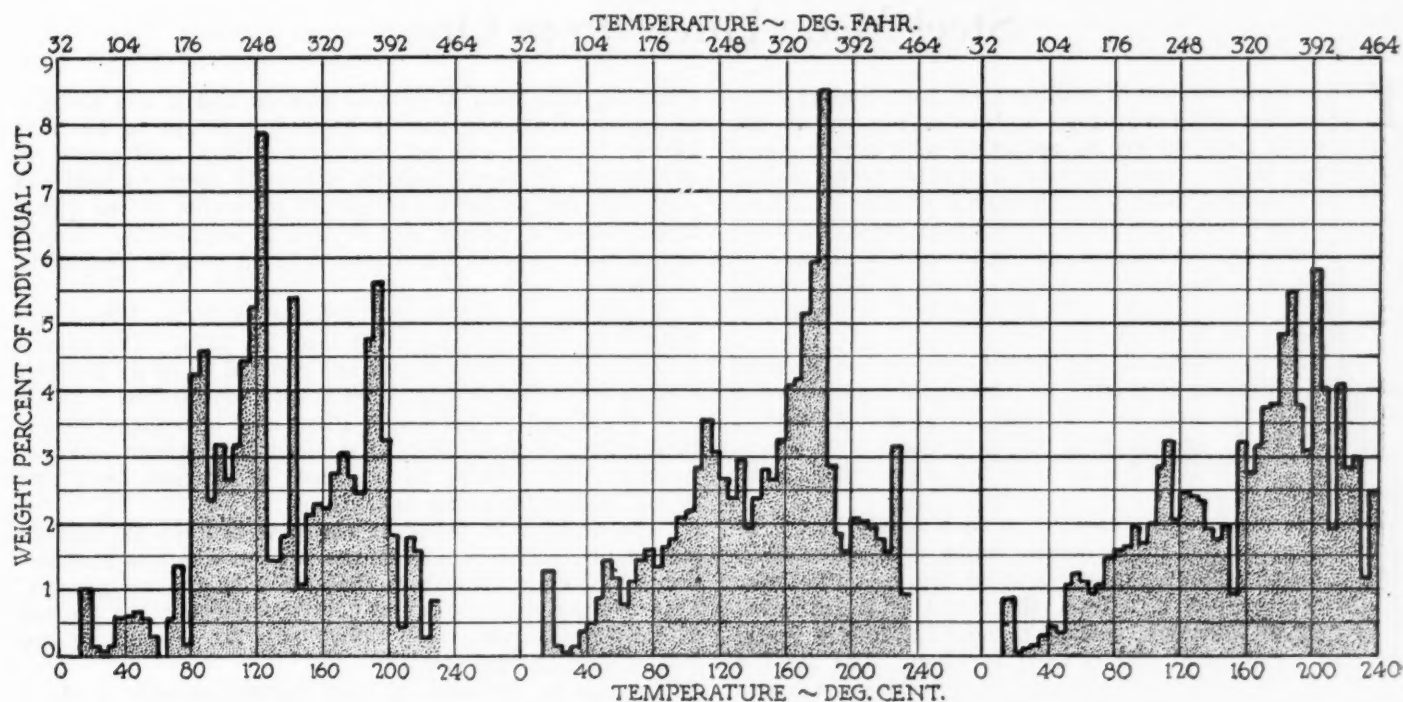


Fig. 5—As distinguished from the curves of Fig. 4, which may be called "cumulative" plottings, these curves may be styled "differential" or "direct" plottings. The three gasolines represented are those most widely sold in Chicago, and were bought at filling stations on March 8, 1922. They are arranged (from left to right) in what seems to be their order of general merit for use in the average carburetion system. No. 1 gasoline (left) is said to be a straight run, non-blended product, which claim is amply supported by the distillation. It is only such a fuel that permits of the relatively sharp definitions between substances as appear in the curve. The more complicated the fuel, however the complication may be caused (by blending, cracking), the more pure substance boiling points there are, and the closer together they will be. This makes it more difficult to separate the components by fractionation; and, in a group of plottings as above, provides important information on the nature of the substances comprising the fuel.

gives only a very vague idea of the substances and the quantities of their occurrence. However, if the data are plotted as in Fig. 5, where the percentage of each cut is treated as a separate entity, much important information is graphically presented. This kind of graph from an efficient and effectively handled fractionation gives at a glance (1) the approximate number of fuel substances appreciably present; (2) approximate boiling points of the substances; (3) the relative importance of their occurrence, and (4) a close approximation to the percentage representation of each of them. The strikingly graphic properties of the direct fraction percentage vs. temperature plot, for the comparison of several fuels, are well brought out in the several sections of Fig. 5.

What Is Wrong with the Standard Test?

IN closure it can be said, in the light of the foregoing, that the things that are wrong in the standard fuel distillation test are:

- (a) No control of the still head temperature;
- (b) Use of an unnecessarily rudimentary still head;
- (c) Distilling rate too high, considering (a) and (b);
- (d) Large distillate percentage increment per cut; and
- (e) No provision for conserving the earliest distillates.

The following values have been taken from the Smithsonian Tables, Van Nostrand's Chemical Annual and the work of Mabery and Goldstein as published in the American Chemical Journal. While this list does not include all of the substances found in gasolines through-

Substance	TABLE I		Boiling Point
		Specific Gravity	Deg. C.
Paraffin Series:			
Butane	C ₄ H ₁₀	.600	1.0
Pentane	C ₅ H ₁₂	.647	36.3
Isopentane	C ₅ H ₁₂	.638	30.4
Hexane	C ₆ H ₁₄	.663	69.0
Isohexane	C ₆ H ₁₄	.676	62.0
Heptane	C ₇ H ₁₆	.701	98.4
Isoheptane	C ₇ H ₁₆	.706	90.3
Octane	C ₈ H ₁₈	.719	125.5
Nonane	C ₉ H ₂₀	.733	150.0
Decane	C ₁₀ H ₂₂	.745	173.0
Undecane	C ₁₁ H ₂₄	.756	195.0
Dodecane	C ₁₂ H ₂₆	.765	214.0
Tridecane	C ₁₃ H ₂₈	.771	234.0
Tetradecane	C ₁₄ H ₃₀	.775	252.0
Pentadecane	C ₁₅ H ₃₂	.776	270.0
Hexadecane	C ₁₆ H ₃₄	.775	287.0
Ethylene Series:			
Butylene	C ₄ H ₈	.635	1.0
Amylene	C ₅ H ₁₀	.666	36.0
Hexylene	C ₆ H ₁₂	.760	69.0
Heptylene	C ₇ H ₁₄	.703	98.0
Octylene	C ₈ H ₁₆	.722	119.0
Nonylene	C ₉ H ₁₈	.767	135.0
Decylene	C ₁₀ H ₂₀	.763	160.0
Undecylene	C ₁₁ H ₂₂	.773	190.0
Dodecylene	C ₁₂ H ₂₄	.785	213.0
Tridecylene	C ₁₃ H ₂₆	.844	232.0
Tetradecylene	C ₁₄ H ₂₈	.794	244.0
Pentadecylene	C ₁₅ H ₃₀	.814	263.0

out the country, it does include all those that occur in significant quantity.

Steel Made Direct from Ore

THE present method of making steel from the ore comprises two distinct stages: In the first pig iron or cast iron is made from the ore by reduction with carbonaceous matter and in the second the cast iron after being melted is decarburized by blowing air through it or over it. Theoretically there seems to be no reason why steel could not be made direct from the ore, but in practice a number of difficulties are encountered. The direct process would seem to be much simpler and quicker and to permit of material savings in the production of steel.

Last year considerable excitement was caused in steel circles of different countries by the announcement of a new process invented by a French metallurgist, Basset.

At the time it was reported that a company with a capital stock of 60,000,000 francs had been organized to work the process.

The Basset process is carried on in a rotary kiln 8 ft. in diameter by 130 ft. in length which is inclined from the horizontal at an angle of about 20 deg. At the lower end, where the fuel is burned, the diameter is increased so as to give sufficient capacity to hold the molten metal and slag. Powdered coal is used for fuel. The air for the furnace is heated in a suitable blast-heating apparatus to about 1832 deg. Fahr. At the throat of the furnace finely ground ore is charged, together with the necessary limestone and coal needed for reduction. Basset claims that he is able to burn his fuel to carbon monoxide instead of to carbon dioxide, and in the light of criticism by metallurgical writers, it appears that any novelty there may be in his process must reside in this feature, as the general type of rotary kiln shown in Basset's drawings has long been known. Ordinarily the fuel, whether coke or

charcoal, will burn to carbon dioxide and if the amount of carbon from the fuel is limited it is apt to abstract carbon from the red hot, carburized metal and cause re-oxidation. In fact, chemists generally seem to hold the view that the production of carbon monoxide by the direct combination of carbon and oxygen is impossible. Basset claims that re-oxidation of the reduced iron is completely avoided.

A critique of the Basset process by Fritz Wuest appeared in *Stahl und Eisen* of Dec. 22, 1921. The advantages for the Basset process are claimed to be as follows: Coal consumption is only 1000 lb. per ton of steel. Labor cost is reduced 75 per cent. Plant cost is reduced 80 per cent. Cost of production is reduced 50 per cent. Wuest analyses these figures on the basis of German costs and comes to the following conclusions:

"The amount in favor of the new process as regards cost of production is 6.78 marks per ton which is a reduction of 10.4 per cent from the cost with the old process. This comparison favors the new process, but the figures of daily production, which affect only 50 per cent of the cost, cannot be agreed with.

"It must be remembered that Basset can only produce finished steel in his furnace if he commences with very pure ore. Usually a product between steel and pig iron will be the result, which must be further refined, whereby the cost of production will be increased, and the new process will not be advantageous compared with the old one. Furthermore, the Basset process cannot be worked without a part of the reduced iron being slagged, and this process is no better than other direct processes as regards complete utilization of the iron."

Improved but Cheaper Closed Bodies Are Predicted

Manufacturers who are ready for the fall trade with substantial but inexpensive closed cars are expected to profit in large sales. Earlier types of cheap closed cars are said to have lacked several features which are considered necessary for unqualified success.

By J. Edward Schipper

NEVER in the history of the automobile business has body design occupied so important a position as it does now. No one who is in close touch with the industry fails to realize that there is a tremendous amount of closed car business to be had this fall. It may be taken as a maxim that the manufacturers who hit the nail most squarely on the head in respect to body design will be leaders in the fall selling. The low-priced closed bodies which have been on the market for a year now have done more to educate the public to the closed car than years of sales arguments and expert coach work.

To put this in another way, the public has never failed to realize the value of the closed car, but it has failed to comprehend the vast difference in price between the closed and the open car. The market has been hungry for a long time for the utility closed car, but it cannot be gainsaid that the market is to a considerable extent disappointed in the earlier types which have been put out. It may be that the pendulum swung too far the other way, and that in order to get down to a price which approximates that of the open car, a certain amount of durability, appearance and other qualities desirable in a closed vehicle were sacrificed. Indications that many manufacturers believe this to be the case have already begun to make themselves apparent. We are finding more substantial construction, involving chiefly the use of pressed steel parts where wood was formerly employed. It is quite apparent that the successful utility body of the very near future is to be a compromise between the earlier form where everything was sacrificed for price, and the regular coach maker's closed job wherein quality was the prime requisite.

IT will very likely happen that after we have learned how to build the closed body as it should be manufactured, the result will be a product which is superior to many of the so-called coach maker's jobs. It is certain that the extensive use of pressed steel is replacing wood in many of the parts where formerly it was believed impossible to use anything else, but steel has not only added to the simplicity and strength of the structure, but has also eliminated a great amount of hand fitting work and made it a machine cut proposition.

The all-steel closed body has a great many problems wrapped up with it. Primarily, it is impossible to manufacture an all-steel closed body without making a large

quantity job of it. It is quite apparent that the tremendous die costs for the pressed steel parts for such a body can only be absorbed through tremendous production if the real benefits of pressed steel are to be derived. On the other hand, if it is possible to eliminate wood altogether as one very large manufacturer has recently done, it is possible to save money in other directions outside of manufacturing. One of the biggest sources of saving is in the finishing of such a job. Instead of using 15 or more coats of paint, it will be possible to get down to 2 or 3 coats of hard baking enamel which can be governed more uniformly, and also provides a surface which stands up under weather conditions and under even more severe washing conditions.

A NEW angle of the used car problem is presented in the merchandising of closed bodies this fall. The new economical type of closed body on a new chassis must be put out at an attractive price to compete to some extent with the used closed bodies which are on the market. To put this in another way, the new type of closed body will be most successful if it gives all of the comforts, appearance and durability of the former coach maker's type of closed body, together with the manufacturing economies made possible (1) by the greater use of pressed steel, (2) by the elimination of expensive curves and bends, and (3) by so designing that to some extent sub-assemblies may be employed which will eliminate the necessity for interior hand fittings, which require the highest class of labor and, owing to the awkward position of the operator in performing the work, is necessarily expensive and laborious.

It cannot be denied that the low-priced closed cars of last fall have been of tremendous value to the industry. They have taught the public to buy closed cars. They have taught the industry that it is possible to manufacture an enclosed car cheaply, even if it has to be done at the expense of what was formerly considered good practice in the coach builder's art. The final outcome will undoubtedly be a body which will cost the public a little more money than the first of these economy closed cars and less money than the old line closed bodies. This is the type of body which is going to sell this fall, and the manufacturer who rings the bell with a closed job is going to find it difficult to keep demonstrators on his dealers' floors.

Peru in Need of Motor Transportation— American Car Makers Can Supply It

Peruvian public must be shown utility value of the automobile.
Economic value of good roads must be proved. American manufacturers can play an important part in this educational movement.
Consignment sales should be seriously considered.

IN going after the Peruvian automotive market, the American manufacturer should not neglect the industrial centers outside of Lima. At present there is no great amount of business there, but there is a worth while amount of future business to be cultivated. The difficulties of financing sales are great because few people in the provinces have money and they do not want to part with what they have to meet their obligations.

At the present time the principal American automobiles in Peru are the Ford, Dodge, Hudson, Chandler, Buick, Willys-Knight, Overland and Reo. The European manufacturer of automobiles has made very little headway since the close of the war. The Renault and Fiat are well represented and there are a number of other makes, but they are limited in number to one of each kind. German automobiles have appeared and there are at present five or more represented, but in negligible quantities. One factor which doubtless has bearing on the scarcity of European cars is that they are generally admitted to be inferior in quality to the pre-war product and this applies to all the countries. That American cars have a foothold is evidenced by the fact that less than 10 per cent of all the cars in Peru are of European manufacture.

Trucks Suffered From the Depression

Truck sales have not been making much headway and the sale of such heavy units as have been made are mostly of European manufacture. Tractors have suffered from depression more than any other automotive products. The future for lighter truck units should be considered favorable as the motor bus service in Lima has grown rapidly and is capable of much expansion. This latter is dependent on an improvement in the condition of the highways.

Importers in Lima have refused to buy and this is due to business instability and the unfavorable rate of exchange. The Peruvian pound is now worth about \$3.50. Recently it fell to \$3.35 but soon recovered. The returns of the Lima Clearing House show a falling off in the daily average of bank clearings in March as compared with February. Considering the number of days in the months the difference in the sum totals was not very great. Even with this falling off in March the situation is better than it was in the corresponding month of the two previous years. It is possible that temporary uncertainty in regard to possible banking developments may have momentarily checked business.

In view of the fact that the unfavorable rate of exchange makes the carrying on of business a difficult task it is necessary to find some way of obviating this difficulty and getting the business. The method of selling on consignment merits the consideration of the American

manufacturer as this appears at present to be the only answer to "How can business be carried on?"

Since Peru depends so completely on her export market, it is necessary that this open up before there can be a great business revival. The chief exports of the country are cotton, copper, wool, rice, sugar, petroleum and rubber. When the foreign demand for these picks up then there will be a market for automotive products. In fact, it may be said that when cotton begins to move in the United States then automobiles will begin to move in Peru.

At the present time the market for the sale of automobile parts is much better than the market for the complete product. This is a fact which is worthy of consideration by American manufacturers.

It is customary in Peru to celebrate the National holidays and this celebration takes place from July 28 to 31. Just previous to the holidays is a very good time to make automobile sales and by the end of the holidays the stock of old cars should be pretty much cleaned out. This starts the last half of the year with a clean slate and the American manufacturer should be able to secure some orders.

There are several things that may be done to cultivate the Peruvian market, most important of which is a campaign of education. The people need to be educated to the value of the automobile and to know how to handle it. They also need to understand the economic value of good roads. Therefore the primary need is to make the public and the roads ready for the use of automobiles. One way to achieve this is to increase the circulation of automotive magazines written in Spanish and by means of this medium, foster an enlightened public opinion.

Another factor which should lend impetus to the use of the automobile is the use of alcohol as an engine fuel. Much space has been given recently in the press as to the possibilities of its use. Fuel alcohol is produced very cheaply in Peru and could its manufacture be fostered it would create a new manufacturing industry for the country.

Belgium Duties on German Cars

INCREASED import duties are now levied by Belgium on various German goods, including automobiles. This measure was taken as the result of a general protest of Belgian manufacturers against German competition made possible by the low monetary value of the mark. In taking this protection, Belgium has only followed the example of France, which has an import duty of 45 per cent on foreign automobiles of all nationality except German, which have to pay 180 per cent.

New Cletrac and Rogers Tractors Undergo Nebraska Tests

Cletrac Model F develops 19.61 b. hp. at 1620 r.p.m. and 9.84 drawbar hp. at about 3 m.p.h. Rogers tractor, which is a much larger machine driving on four wheels, developed 63.04 b. hp. at 822 r.p.m. and 35.47 drawbar hp. at a speed of 3.34 m.p.h.

TWO additional tractor tests have recently been completed by the Nebraska Board of Tractor Test Engineers, which, under the Nebraska law, are required to test all tractors offered for sale in that State. The two machines recently tested are the new Cletrac, Model F, which has been fully described in these columns, and the much larger Rogers tractor, which is a four-wheel drive type fitted with a much lower-speed engine than that used in the Cletrac. Both machines completed the test successfully, the Cletrac being operated on kerosene and the Rogers on gasoline.

The tests made include a two-hour brake test at rated load and speed, a one-hour test at varying load, a one-hour test at maximum load and a ten-hour test pulling rated horsepower at the drawbar.

The Cletrac tractor had an Eisemann high-tension magneto and a Tillotson carbureter. It is of the creeper type and weighs 1920 lb. Following are the results of the brake horsepower tests: Rated load test—Horsepower developed, 16.36 at 1611 r.p.m., running on kerosene with a consumption of .79 pt. per hp.hr. Together with the fuel there was consumed 0.29 gal. of water during the 2-hr. test. In the maximum-load test the engine developed 19.61 hp. at 1620 r.p.m. and consumed kerosene at the rate of 1.19 pt. per hp.hr., with a water consumption of 1.47 pt. per hr. In the half-load test the engine developed 9.38 hp. at 1826 r.p.m. for 60 min., consuming kerosene at the rate of 1.08 pt. per hp.hr. together with a total of .67 pt. of water.

In the drawbar tests at rated load, extending over a period of 10 hr. the tractor developed 9.84 drawbar hp., that is a drawbar pull of 1251.5 lb. at a speed of 2.945 m.p.h., whereas in the maximum load test the tractor developed 13.145 drawbar hp., or 1780 lb. drawbar pull at a speed of 2.77 m.p.h., the engine speed in both drawbar tests being 1568 r.p.m.

During the complete test, consisting of about 30 hr. running, the following oil was used: For the engine, 3 $\frac{3}{8}$ gal. of Mobiloil A (3 gal. to fill crankcase and transmission and 5 pints added during test).

No adjustments were made. During the 10-hr. drawbar test one roller, washer and retaining key for shoe pin were lost. Test was not interrupted. At the end of the test the engine and tractor were in good running condition, and there were no indications of undue wear in any part nor of any weakness that might require early repair.

Test of Rogers Tractor

The Rogers tractor was fitted with a Berling magneto and a Zenith 2-in. carbureter. The engine of this tractor is a Buffalo 4-cylinder, vertical L-head of 6 $\frac{3}{4}$ -in. bore by 9-in. stroke, with a rated speed of 800 r.p.m. This is a four-wheel drive tractor with disk clutch and two speed forward and two speed reverse gear, the low speed being

1.6 m.p.h. and the high speed 3.6 m.p.h. An hydraulic steering gear is fitted. The tractor weighed 19,500 lb.

In the rated load test the engine of this tractor developed 61.3 hp. at 815 r.p.m. for a period of 2 hr., consuming gasoline at the rate of 1.26 pt. per hp.hr. The atmospheric temperature during the test was 64 deg. and the temperature of the cooling water leaving the engine, 192 deg. Fahr. During the varying load test a belt slippage of 1.5 per cent was noted, and when the engine delivered 37.9 hp. at 831 r.p.m. the fuel consumption was at the rate of 1.64 pt. per hp.hr., the atmospheric temperature being 60 and the water temperature 173 deg.

In the maximum-load test the engine developed 63.04 hp. at 822 r.p.m. and consumed gasoline at the rate of 1.23 pt. per hp.hr., whereas in the half-load test it developed 31.48 hp. at 827 r.p.m. and consumed 1.68 pt. per hp.hr.

In the drawbar tests at rated load the horsepower output was 35.47, the drawbar pull being 4215 lb. at 3.34 m.p.h., corresponding to a crankshaft speed of 828 r.p.m., the slip of the driving wheels being 4.42 per cent. The fuel consumption was at the rate of 1.88 pt. per drawbar hp.hr. and the loss of water at the rate of 0.65 gal. per hour. The atmospheric temperature was 79 deg. and the water temperature 199 deg. In the maximum-load test in high gear the tractor developed 39 drawbar hp., that is 4215 lb. drawbar pull at 3.47 m.p.h. During a maximum drawbar hp. test in low gear the tractor developed 34.85 hp., or 10,000 lb. drawbar pull at 1.31 m.p.h. The wheel slippage in this latter test was 3.36 per cent on the basis of the circumference of the wheel rims and 14.79 per cent based on the points of the wheel lugs.

During the complete test, consisting of about 78 hours running, the following oil was used: For the engine, 23 $\frac{1}{2}$ gal. of Mobiloil B (9 gal. to fill crankcase and 14 $\frac{1}{2}$ gal. added). For the transmission, 1 $\frac{1}{2}$ gal. of 600 W. For steering gear reservoir 4 gal. heavy Polarine.

The following adjustments were made before any official data were taken: Shortened fan belt, 4 new spark plugs, adjusted one valve tappet, put on larger vacuum tank, put on new governor spring, removed belt clutch throwout arm and tightened spring, pulley clutch throwout not used during test.

The following adjustments were made after the test began: Magneto points dressed 4 times, magneto points replaced, put in 4 new plugs, repaired broken fan bracket, lacing on fan belt broke three times, welded water manifold, enlarged suction line on oil pump.

At the end of the test the compression was slightly lower on all cylinders. Right steering cylinder was leaking oil, otherwise the tractor seemed to be in good working condition.

No fault was found by the Board of Test Engineers with the advertising literature issued by the manufacturer of either tractor.

Industry Well Served by Automotive Division, Department of Commerce

Annual report reveals extent and effectiveness of work already accomplished. Automotive statistics being revised and trade lists containing much valuable information prepared. Close contact with industry maintained through important trade associations.

THE annual report of the Automotive Division of the Bureau of Foreign and Domestic Commerce, Department of Commerce, covering the fiscal year ending June 30, 1922, has just been issued, and indicates that the effective co-operation with the automotive industry planned by Secretary Hoover has been established and is bearing fruit.

A summary of the report follows:

The Automotive Division of the Department of Commerce was organized in the early part of September, 1921, by Gordon Lee, Chief, and Wm. I. Irvine, now Automotive Trade Commissioner in the Far East, with a view of assisting manufacturers of passenger cars, motor trucks, motorcycles, accessories, airplanes and motor boats, in their foreign trade activities. During the year the Division personnel has increased from two to eleven people. The number of commercial inquiries answered by the bureau and the district offices regarding automotive products, which amounted to 40 in the week ending Oct. 8, 1921, totaled 1090 during the week ending June 10, 1922. This increase in work demonstrates the extent to which the organization of the division and its contact with the industry has proceeded.

Accomplishments

The following work has been accomplished by the division during the year:

1. Contact has been formed with members of the important automotive trade associations representing approximately 1500 of the automotive manufacturers of the country. The members of these associations were invited by the Automotive Division direct as well as through their foreign trade secretaries to become listed on the Exporters' Index and subscribe to "Commerce Reports."

2. Approximately 1500 non-associated members of the automotive industry were circularized with a letter explaining the co-operation afforded them by the Automotive Division.

3. A reclassification of automotive statistics has been brought about, passenger car exports being divided into three groups beginning Jan. 1, 1922: cars valued at less than \$800, \$800 to \$2,000, and above \$2,000; motor truck exports: motor truck of a capacity less than 1 ton, from 1 to 2½ tons and over 2½ tons.

4. Revised automotive trade lists outlined by the division are to include the following information on automotive importers and dealers: name, address, size, nationality, motor vehicles or tires handled, selling organization, facilities for storage, service and vulcanizing and side lines handled. To the names of dealers and importers is to be added a list of banks handling automotive

paper, giving their name, address, capitalization and branches. It is expected that a number of these revised trade lists can be furnished the industry in the course of the coming year.

5. In December and January Messrs. Lee and Irvine visited approximately 40 automobile manufacturers, to get the industry's viewpoint.

6. Wm. I. Irvine, Automotive Trade Commissioner, left for the Far East where he has undertaken an investigation of the automotive market as well as carrying on educational work along the lines of good roads promotion and automotive transportation.

7. The Division was called upon to make a study of the automotive production facilities in France, England and Italy on behalf of the Limitation of Armament Conference. This investigation furnished the first reliable basis by which the productive capacity of European automotive manufacturers could be estimated.

8. Upon request of the Senate Finance Committee, the Associated Advertising Clubs of the World, the National Automobile Chamber of Commerce and the Association of Motor Truck Industries, an investigation was undertaken regarding the reimportation of American motor trucks from war surplus stocks in Europe. From 1918 to 1921, 10,926 American motor trucks were reimported into the United States and 2,700 are held by British concerns at present for reimportation.

9. The Automotive Division has been endeavoring to bring about the prosecution of fraudulent exporters. Several of these cases which were reported from foreign countries were turned over to the Postmaster General's Office and will be carried through either with the co-operation of Government agencies or automotive trade associations.

10. The first official automotive world census has been established through a questionnaire which was forwarded to the foreign representatives of the Department of Commerce and Department of State.

11. Questionnaires were sent to all members of the trade associations with whom contacts had been formed, with the purpose of arriving at standard export practices by analyzing the trade practices followed by automotive exporters in the past and communicating the results of this investigation to the industry in terms of percentages.

12. With the co-operation of the Division of Foreign Tariffs and the American Minister in Berne, a modification of the Swiss customs regulations was brought about, as a result of which more favorable treatment than heretofore is accorded American automotive manufacturers importing into Switzerland.

13. The Automotive Division was instrumental in bringing about, through the motion picture engineer of

the United States Department of Commerce in co-operation with the Studebaker Corporation, the production of a five reel motion picture film, "The Story of an Automobile." This film promises to enjoy great popularity and as it will find wide distribution here and abroad its educational commercial value can hardly be underestimated.

14. The middle of June, Mr. Lee left for a two months' speaking tour through the West. On this trip he will give approximately forty addresses with the purpose of making more widely known the services offered by the Bureau of Foreign and Domestic Commerce and in particular by the Automotive Division.

15. "Selling the World Automotive Transportation," a booklet outlining the services offered to the industry by the Automotive Division, has been issued by the trade associations co-operating with the Division. Approximately 4,000 copies were distributed to the members of these associations and nearly 1,000 to the foreign representatives of the U. S. Department of Commerce and Department of State.

16. A foreign trade meeting, held in the middle of April, attended by the chairmen and secretaries of the Foreign Trade committees co-operating with the Automotive Division and representatives of automotive trade papers, resolutions were adopted endorsing the services rendered the industry by the Automotive Division and extending appreciation and cordial assistance to the Secretary of Commerce, the Director of the Bureau of Foreign and Domestic Commerce, and the Chief and Assistant Chief of the Automotive Division.

The first part of the organization work consisted in creating facilities for the distribution of incoming information as well as establishing permanent files in which this information could be held for ready reference. With the exception of one questionnaire, no instructions were given as to the nature of the information desired.

1. Information is being disseminated to the trade by commerce reports, special and confidential circulars, exhibits, monographs and trade papers.

In order to give reports from field representatives as much space as possible in Commerce Reports, the number of original contributions from the Division was limited, but many important articles (several of which have appeared in the columns—Editor) were published.

Short items of interest to the industry are being published in the "Automotive Digest" which forms a part of the Automotive Section of Commerce Reports. Information of particular importance to the trade or to a small group of automotive manufacturers is being disseminated through special and confidential circulars, eighty of which were mailed out in the course of the year.

In order to stimulate interest in the Automotive Division and with a view to inducing manufacturers to become listed on the Exporters' Index, information concerning a large number of particularly attractive trade opportunities was mailed out in the form of confidential circulars besides being referred to in Commerce Reports.

Numerous requests have been received for exhibits which were referred to in Commerce Reports and which represented articles of a technical nature or exhaustive

studies which could not be published in Commerce Reports.

Monographs on the following automotive markets have been completed: Dutch East Indies, Argentine, Bolivia, and Chile.

The majority of articles published by the Automotive Division have been reprinted in automotive and other trade papers.

2. Automotive trade information is kept in a file arranged by countries, each of which is subdivided into sixteen headings, among which are included production, distribution, service, sales promotion, preferences, status of market, fundamental potentiality, automotive transportation, automotive legislation, roads and fuel.

Establishing Contact with Industry

The interest which has been taken by the industry in the work of the Automotive Division has been based largely on the close contact which was formed with the following trade associations: National Automobile Chamber of Commerce, Motor and Accessory Manufacturers Association, Motorcycle and Allied Trades Association, Aeronautical Chamber of Commerce, National

Association of Engine and Boat Manufacturers, Association of Automotive Equipment Manufacturers, and the Automotive Equipment Association.

Considerable work was contributed by the Division toward the compilation of a Manual which the National Automobile Chamber of Commerce is issuing on behalf of its members. An extra supply of Manual sheets are being turned over for distribution to the Automotive Division as issued. Through the latter the Manual is made available to the entire auto-

motive industry against a nominal charge.

After completion of the National Automobile Chamber of Commerce Manual, the Automotive Division proposes to compile similar manuals for the other branches of the automotive industry, including accessory manufacturers, motor boat and engine manufacturers and airplane manufacturers.

Strengthening of the Division's Organization

While in the past the flow of information for dissemination as well as for the files was not directed through any specific channels, the Division, in the coming year, will request the foreign representatives of the Department of Commerce and Department of State to submit specific data covering the various points outlined in the filing system of the Division. For this purpose a general instruction sheet will be forwarded to all the foreign representatives which will be followed later on by individual requests for specific data.

It is expected that by following such a procedure, the Division will be able to better inform its field men of the particular needs of the automotive industry. Furthermore, by establishing individual contacts, the educational work along the line of good roads and motor transport promotion, which has been successfully started in several countries, can be carried on more extensively. The Automotive Division is formulating plans to supply all the material which is necessary for such educational work.

AUTOMOTIVE manufacturers who are not availing themselves of the service extended by the Automotive Division will do well to consider this report.

Others who have followed the work or taken part in it will find in this review of accomplishments ample justification for continued support and co-operation.

The Division is seeking to stimulate foreign automotive trade as well as to provide information concerning present and future markets and the conditions which will be encountered in selling to these markets.

What Kind of Educational Work Is Good for the Foreman?

The basis of the foreman's education is proficiency in the work he is required to direct. Consequently he should be helped to acquire that proficiency. Square dealing and a knowledge of the company's policies and the use of its products are also important.

By Harry Tipper

THE developments in the educational work conducted by industrial establishments for their employees and, particularly, those courses directed toward the improvement of the foremen in the shops, indicate how largely we are experimenting with education as yet, and how little we have coordinated education with the actual requirements of industry. Educational work and the acquiring of knowledge, which has no visible application to the man's occupation or to the necessities of his life do not improve either his capacity as a worker or his value as a citizen. It is much more likely to enlarge his aspirations, making him more restless without increasing his capacity to grow to the point where his aspirations are satisfied. After all, the most important job in industry is to educate the leaders so that they are competent to fulfill the tremendous responsibilities of leadership devolving upon those in charge of the manifold interests of industry to-day.

Leadership, because of the responsibility for the actions of the thousands of workers and the relations between the organization and the other industrial elements, demands an efficient, wide, fundamental education and a varied experience, if the leaders are to fulfill these large responsibilities wisely in the future of industry. It is easily possible to educate men on a lot of subjects which, however valuable in themselves, do not have any particular relation to their activities either as workers or as citizens, and a good deal of our experiments in education have generally resulted in this kind of work being carried on.

Undoubtedly, the education of the foreman is of great importance because he is the leader of the workers, the most intimate supervisor, and, consequently, the hinge control in the development, the understanding, and the carrying out of any policy. It is of importance that his education should be developed along practical lines. The foreman should be a leader. It is important that he should be recognized as a leader by the men of whom he is in charge. Upon this recognition depends, to a large extent,

efficiency of production and the lack of unrest in the shop.

What are the qualities which the worker recognizes as those of leadership in the foreman?

It is not possible to state them all concisely for foremen of various types are equally successful in their work, but there are one or two important elements always present in the foreman who is notably successful in maintaining a high degree of efficiency and a low turnover. One of the most important of these qualities is proficiency in the

particular work his men are called upon to do. Men are not willing to submit to the leadership of other men who are not as proficient in a particular occupation as they are. Skill must be matched by a larger skill and understanding in the leader himself. Whatever valuable qualities the supervisor may have, they do not inculcate the respect, without which there can be no leadership, unless the practical skill is visible and the practical knowledge always on the job. This is the most important point in the education of the foreman. He must be

skillful in the work of which he has charge. His general skill and his understanding should be greater than that of the worker and his judgment more sound. Consequently, the basis of the education of the foreman is the development of his proficiency in his particular occupation and requirements. He must be able to win the respect of the men for his knowledge—and this means that his knowledge must be translatable into practical skill and understanding so that it becomes visible to the men.

Beyond that, the most important requirement of the foreman is that he shall be square in his dealings with the men so that his judgment in dispute is recognized; his statement accepted and his justice understood. This amplifies his leadership by adding to the leadership in work, the leadership in human quality, which enables him to hold all the men under him sure of the treatment they will secure and confident of the judgment rendered.

The third element of importance is that he should understand the purposes and policies of the company, the uses of the product, and the general organization, so that

THE foreman's education should include:

1—A wide, definite and specific training in occupational technique and theory.

2—Careful consideration of the responsibilities of the supervisor and the need for square dealing with the men under him.

3—Instruction in the policies, purposes and organization of the concern and the use to which its products are to be put.

At least half of this education can be developed out of the organization at interest while the remainder is securable from recognized educational sources.

he can readily interpret these in his contact with his subordinates.

The educational program which proposes to add to the capacity of the foremen so that their average efficiency may be increased, should be based upon these requirements as the primary requirements of foremen and the necessary elements in successfully leading a group of men in that intimate supervision. This means that the education should include:

First—A wider, more definite and more specific training in the occupational technique and theory.

Second—A careful consideration of the responsibilities of the supervisor and the necessity for honest and honorable judgment and consideration of each man.

Third—An education in the policies, purposes and organization of the concern, the usefulness of the products and the general operations with which the organization is dealing.

Such a course of education as this requires that at least one-half of it shall be applied strictly to the conditions under which the foremen are working and, consequently, developed out of the establishment itself. The other half of the educational work can be secured from the proper selection of educational material of a more general character, such as can be secured from recognized educational sources.

The theory back of the practice and the general human requirements of leadership can be secured because they are sufficiently general to apply to most cases. Increased proficiency in the particular occupational development, and education in the company's organization policy and operations, must be gathered together from the particular establishment and arranged in connection with that particular requirement of work. Applied education—that is, the education which is applied to the work or to the social requirements of the individual—is always much more valu-

able than the abstract education which can be secured by general study.

Comparatively few men are able to think abstractly in regard to their problems. They learn by the concrete necessities of their work or their social life; consequently, the educational effort needs to be strictly applied to the particular requirements of the concern and the locality, in most cases where foremen are being dealt with. Even where the general basic theory of the practice, such as can be secured from general educational sources, is being considered, it is necessary that the illustrations pertain to the particular work of the organization and apply themselves, consequently, to the particular group who are engaged upon the study.

It is not wise to experiment in the type of education to be given to workers or foremen very much. Any education which is provided should be strictly along the lines of the known necessities and applied definitely along the lines of known value. No mistake can be made with any workers in giving them additional education or training which increases their applied skill in connection with their particular work. A certain amount of theory is necessary with this applied work, and, in the case of the foremen, a good grounding in theoretical fundamentals is important.

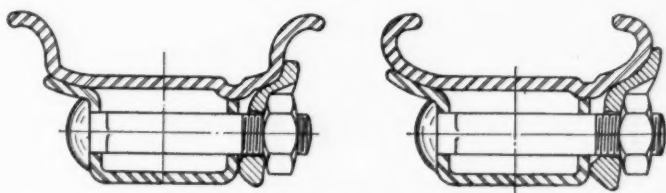
All these should be strictly applied to the company's policies, purposes and operations wherever possible, or illustrated by practices in the particular concern and other concerns of a similar character. Any larger education should be reserved for those whose actions suggest a capacity for greater responsibility, and who are, therefore, fitted to receive a larger educational attention necessary for the larger responsibilities.

Leadership in skill—leadership in company development—and leadership in square-dealing—are the three important elements of education of foremen in industry and should form the backbone of every educational program.

Steel Wheel Felloe Introduced by Standard Parts

A NEW steel wheel felloe intended for use in place of the usual type of wood felloe has recently been placed on the market by the Standard Parts Co. As will be seen from the accompanying cut, the felloe is of channel section but in external appearance closely resembles the conventional wood felloe which it replaces. It is said to possess the advantage of light weight without sacrifice in strength and to give full circumferential contact on both sides between the detachable rim and the felloe and thus eliminate squeaks which often occur at this point. It also prevents the entrance of dirt and water. It is adaptable to both clincher and straight side rims. The clamps are shaped to conform to the contour of the rim and are so arranged that the retaining nuts come well within the wall of the

tire. In general, the construction is said to be such as to prevent bending of clamp bolts, loosening of rims and wear on clamps.



Sectional views of the new Standard Parts steel wheel felloe as adapted to straight side and clincher type rims

Swiss Concession in Tare Rates on Automobiles from Overseas

BY a ruling of the Swiss Director General of Customs, effective May 1, the minimum addition for tare to the weight of automobiles shipped boxed, which formerly increased the duty on the car itself by 30 per cent, has been reduced to 10 per cent, which is the tare hitherto assessed on automobiles only when shipped in light or no packing, and a special rate of 20 per cent of the net weight established for detached pieces and spare parts, provided such automobiles and parts are unpacked from their original crating in the free custom houses of Lausanne or Geneva, or in those which may subsequently be created. The concession was granted as a result of con-

tinued representations by the American Legation at Berne on behalf of American exporters of motor vehicles.

The exact phraseology of the new Swiss tare regulations on automotive products, which are understood to apply only when they are unpacked from their original crating at the named points on the Swiss border, is as follows:

(1) On automobiles imported with or without bodies, the additional weight of the container will be determined at 10 per cent of the net weight.

(2) For detached pieces and repair parts for vehicles of all kinds, at 20 per cent.



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Effect of Strikes on Industry

SURPRISING indifference has been shown by industry and business as a whole to the long-continued coal strike and the walkout of railroad shopmen with the threat of even greater defections from the ranks of the carriers' employees. Even if both these disputes are settled before this issue of AUTOMOTIVE INDUSTRIES reaches its readers they will have exerted a seriously adverse effect upon the commercial machinery of the country.

The ever-present and constantly recurring controversies between labor and capital constitute one of the most serious problems with which the country has to deal. The Washington administration has been criticised, and perhaps justly, for permitting the coal strike to drag along for more than three months.

But the most unsatisfactory part of strike settlements up to this time has been their temporary nature. The people of the country, who always are

the innocent bystanders who usually suffer most in any kind of battle, would hail with delight the establishment of some machinery which would prevent the almost perennial walkout, or threatened walkout, in the coal fields with the inevitable price increases. President Harding seems to have started along this road, and if he reaches the goal it will be a valuable achievement.

Settlement of disputes between the carriers and their employees was the avowed object of the Railroad Labor Board. That body would function more efficiently if there were a few teeth in the law which created it. Moral suasion, which is about the only weapon it possesses, does not exert a very potent influence in such disputes.

There is apparent at present a trend toward compulsory arbitration. It is generally conceded to be a good system as long as it hits the other fellow. When it comes closer home its merits are harder to see.

Lessons of the Grand Prix

IT is rather early to draw from the meagre cable reports thus far received any final conclusions regarding the performance in the French Grand Prix Race of engines with so little as 122 cu. in. piston displacement. There are, however, some more or less obvious speculations which will arise in the minds of those accustomed to follow events of this character.

One hundred and twenty-two-inch engines should probably not be judged by the results of the first important race in which this limiting capacity was imposed, but it must be admitted that the number of mechanical failures is not encouraging, although the winner succeeded in maintaining a higher average speed than the winner of last year's race with an engine 50 per cent larger. The Fiat engine is said to be capable of developing 90 hp. for long periods, but to do this it turns at 5000 r.p.m.! Such an extraordinary speed is possible with the refined design, materials and workmanship used in racing engines, but anything approaching this in quantity production, granting for argument that it is desirable from other standpoints, is unthinkable. It is true, of course, that with so small an engine reciprocating parts can be made light, but when it is remembered that the stresses involved increase with the square of the speed while the number of reversals of stress are in direct proportion, is it small wonder that mechanical failures were numerous?

On the other hand the tire performance recorded is most encouraging. Six hours running over highways with numerous turns and at very high speeds without a single blowout is unusual if not unique. More details regarding the type and construction of the tires used will be awaited with interest. It is probable, however, that comparatively light loading of the tires was a most significant factor in the results. Some of the cars are said to have weighed less than 1500 lb. which would give a very low weight per tire.

Four-wheel brakes were much in evidence as was to be expected for racing purposes where cost is

entirely secondary. They are increasing in popularity on stock European cars, but even this is not especially significant to the American manufacturer who is seeking to decrease rather than to multiply parts. Nevertheless there is still much room for improvement in brake design and construction on American cars and any lessons in this connection which the race may teach should not fall on deaf ears.

It is interesting to note that several of the engines used in the race were fitted with anti-friction bearings on the crankshaft and in some cases all bearings except those on the wrist pins were of this type. This is a matter which should be noted by engine designers as well as bearing makers. The practice is old and yet new. Its revival is evidently made possible through the advent of better methods of manufacture and better materials, as well as by better lubrication and a desire to minimize friction losses.

Knocking and Its Control

IN the automobile engine built eighteen or twenty years ago compression pressures as high as 100 lb. p. sq. inch. were occasionally used, and no great amount of trouble was experienced as a result of these high compressions, although at times when the cylinder walls had become covered with rather heavy layers of carbon deposit there may have been unpleasant knocking. But as the fuel characteristics began to change and the end point rose higher and higher, it became necessary to lower the compression pressure.

Some of the tractor engines designed to burn kerosene are reputed to be operating at a maximum compression of 45 lb. p. sq. in. This, however, is not even the worst case of low compression, for altitude has an influence on this factor. At the recent S. A. E. meeting it was reported that in Denver 10,000 ft. above sea level, Ford passenger car engines operate at a maximum compression of only 35 lb. p. sq. in. With a decrease in the compression ratio the thermal efficiency drops and now that we are facing a scarcity of fuel and fuel prices are again on the rise, this is certainly a serious matter.

Various measures can be taken that will permit of the use of higher compressions without danger of causing the engine to knock. It is generally agreed that the introduction of a considerable proportion of the fuel into the engine cylinders in an unvaporized state has a tendency to increase knocking, and thorough gasification of the fuel prior to its introduction into the engine therefore tends to check the trouble.

Alcohol and similar substitute fuels have been used experimentally practically ever since the automobile first came into general public use, and the fact that with this fuel it is impossible to produce knocking even with compressions twice as high as ordinarily carried in gasoline engines, could not escape attention. Neither could the excellent results obtained as to thermal efficiency, which largely make up for the low calorific value of the alcohol.

The high compression required to burn alcohol to the best advantage accentuated the disadvantages as-

sociated with high compression, such as difficult cranking, and the plan of mixing the alcohol with gasoline and thus obtaining a fuel with an intermediate maximum compression ratio, suggested itself. Unfortunately commercial alcohol and gasoline do not mix, and it was necessary to add a third substance.

So far the endeavor in the use of mixed fuels with non-knocking characteristics always has been to eliminate trouble from knocking in engines with an average compression ratio. But once means are found of effectively controlling the knock there is apparently no reason why the possibilities in the way of increased fuel economy due to higher compression should not be taken full advantage of.

Once the doped fuels of which we have heard so much the past few years are commercially obtainable, the compression ratio should be increased from the present average of about 4 to 1 to 7 to 1. But it is obvious that such engines cannot be sold to the general public until the doped fuel is pretty generally available, because if attempts were made to operate them on the ordinary gasoline with this high ratio there would be no end of trouble.

Taxation and Regulation

MEN in all branches of the automotive industry might find a worse use for their time than to spend a little of it mulling over the question of legislation. In these days of high taxes, when possible sources of revenue have been milked almost dry, the motor vehicle is rapidly becoming the universal legislative goat.

When a State Legislature needs a few million dollars for something or other it says to itself, without a single twinge of conscience, "Let's take it out of automobiles or trucks or the gasoline which is used to run them." Motorists have been hit with the legislative mace so often, without making much of a howl about it, that it seems to be accepted without argument that they never will howl.

But motorists are making up their minds that they have been stepped on often enough. They don't mind paying the taxes necessary to maintain highways but they can't see why they should build all the little red school houses and city halls. Motor vehicle taxation is building up sales resistance, and manufacturers and dealers should take a direct personal interest in the situation. They are the ones who will ultimately suffer most.

While onerous and unfair taxation is bad enough, there is another form of legislation which is worse. It is that which is designed, theoretically, to promote safety and prevent needless damage to highways. Motorists and the automotive industry would welcome sane legislation along these lines but they should object most strenuously to statutes which provide, figuratively speaking, that the highways can be used on Mondays, Wednesdays and Fridays only by blondes, on Tuesdays, Thursdays and Saturdays by brunettes and on Sundays only by those whose hair is red.

Seasonal Sales Decline Not Sharp

Slight Slowing Up in Some Sections

Farm Market Shows Life—Strike Likely to Delay Production of Motor Vehicles

By JAMES DALTON

While the entire industry is awaiting the expected mid-summer lull in business and is prepared for it, a decline in sales has become apparent only in spots. There has been a slowing up in New York, Chicago and other big cities, but nothing which can be characterized as a slump.

Factories report, on the other hand, that dealers in agricultural districts who have been more or less quiescent for a long period, are sending in substantial orders. This is a positive indication that the farm market has come to life because these dealers are not taking cars merely on a chance of selling them.

Production schedules have not been curtailed materially and while the output in July will not reach the June record of 271,000, it would not be surprising if it approximated 200,000. Last July, with a production of 176,000 passenger cars and trucks, was the best month of the year with the exception of August.

Parts makers have noted no shrinkage in the volume of their business. All of them assert their July sales will be as large as those for June and a good many say their business will be better this month. Commitments indicate that August will be equally good, but commitments under present conditions do not make a thoroughly reliable barometer. Manufacturers feel little hesitation in canceling or holding up shipments.

Truck production continues to average between 10 per cent and 12 per cent of the total output. Substantial sales of light commercial vehicles are expected in the agricultural districts, but sales of heavy duty trucks still are handicapped by the presence in this country of a considerable number of unabsorbed American-made army trucks sold in Europe after the armistice and reimported. Several thousand more of

(Continued on page 141)

Business in Brief

NEW YORK, July 17—For the first time in many weeks there have been reports of a slowing up in business and industry. They are the direct results of the coal and rail strikes and indicate that there will be more serious dislocation unless the labor difficulties are promptly settled.

Labor troubles are to blame for the only notes of hesitation which have become apparent in the business world. Transportation delays are especially exasperating at a time when a special effort is being made to produce and deliver products already ordered.

Apart from the industrial unrest, the situation is full of favorable factors.

Crop prospects are better than a year ago.

Building activities are proceeding at an unprecedented rate with the lumber, cement and brick branches working at full speed.

Unemployment, except that which is voluntary, is practically negligible.

Crop reports are particularly gratifying. It is estimated that the wheat harvest will approximate 817,000,000 bushels, the sixth largest on record, and corn 2,860,000,000 bushels, the seventh largest on record.

Stocks are irregular, bonds firmer, call money easier, sterling steady and other exchanges higher.

Bank clearings for the week ending July 13 aggregated \$7,263,105,000, a gain of 6.7 per cent over the previous week and 23.1 per cent over the same week last year.

MOON REELECTS DIRECTORS

ST. LOUIS, MO., July 17—The stockholders of the Moon Motor Car Co. re-elected the old directors at their annual meeting. At the subsequent organization meeting of the directors, A. F. Moberly, who had been treasurer and purchasing agent, was elected vice-president. H. W. Klemme was made treasurer. Stanley Moon was elected secretary to succeed George H. Schelp. President McDonald reported to the stockholders that the company's business now is the heaviest in its history, with the production running between forty and fifty cars a day. He said that unfilled orders on hand July 1 were approximately 15 per cent larger than those on hand June 1.

War Trucks Still Threaten Industry

Thousands Ready for Re-Importation—Makers Urge Passage of Graham Resolution

DETROIT, July 17—Development of truck business in the United States by manufacturing companies is being seriously handicapped at this time by the presence of still large stocks of war trucks brought back from Europe by speculating companies. Word has been received in this city of purchases by large fleet owners in recent weeks of war trucks at prices which made competition impossible.

A strong effort is being made by the speculators in war trucks to induce regular dealers in the trucks which they have in stock, to handle these at retail to the trade at such profit as they are able to realize. The dealer trade of the entire country is being steadily canvassed by mail to line up a selling organization, and the belief is shared in the industry that with a sales organization formed, the speculators will undertake to bring in many more trucks from abroad.

Price reductions in 5-ton models of two very prominent makes by the speculators in the past few weeks place these at \$1,340 and \$1,580 respectively, prices which are about on a par with the usual run of 1-ton models. These price changes were broadcasted throughout the country to dealers. The most serious effect of the canvass is that it discourages dealers and is retarding the development of new truck business.

Demand Graham Act Passage

In the face of competition of this kind, truck makers are turning to Washington to seek the passage by the Senate of the Graham resolution, which would impose a 90 per cent duty on these reshipped vehicles. The harm that is being wrought the industry by the presence in this country of the present war trucks is considered as nothing to the damage that would be wrought if the bars against them are permitted to remain down.

At least five companies are known by truck manufacturers to be prepared to bring in these vehicles at the first indication that the truck market is in satisfactory condition to give them a ready sale.

Truck makers report that they have received information from a reliable source that American trucks are being counterfeited in the Krupp factories in Germany and that these will be shipped back as trucks that were originally made in this country.

Tire Fluctuation Unsettles Market

Demoralization Grows in Rubber Center—Quality and Price Continue Downward

AKRON, OHIO, July 18—Price cuts, price increases and production of cheap tires to meet competition by some of the larger rubber companies have added materially to the demoralization of the automobile tire industry in Akron.

The Mason Tire & Rubber Co. has announced a 28 per cent reduction in its entire line and also a new oversized, non-skid, air bag cured Ford cord tire to sell at \$11.80.

At the same time the American Rubber & Tire Co. announced an increase in its entire cord tire line of 5 to 10 per cent.

Mason Tire & Rubber Co. stated in its announcement that the time has come to bring tire prices definitely to rock bottom to prepare for fall business and spring dating orders.

Must Know Prices

"Special discounts by dealers must stop," said D. M. Mason, vice-president and general manager. "Everyone must know the price of tires and they must become stabilized if we are to get any volume of spring dating business this fall. The time has come for a new true value tire list."

The American statement gives evidence in an entirely new direction. H. L. Hauck, general manager, stated:

"We made a thorough canvass of our dealers before making the announcement regarding an increase in tire prices, and we feel that they will support us in this move."

"We placed the proposition of increasing prices and maintaining quality or cutting the price and decreasing quality squarely up to our dealers. We explained the predicament in which we found ourselves, and we have been agreeably surprised in the manner with which the dealers backed us in our suggestion of price raising."

For the present the increase is confined to cord tires, and it is not likely that the increase will be extended to fabrics because of the small number still made, according to company officials.

Official confirmation of the production
(Continued on page 138)

FORD MAKING OWN GLASS

DETROIT, June 17—Manufacture of its own plate glass for windshields has been begun by the Ford Motor Co. in a modern plant. Ford production methods have been applied and there is a radical departure from established practice. The Ford continuous conveyor system features the operation so that from the time the glass leaves the furnace until it becomes a polished windshield, it is always in motion.

Trailers Will Serve to Enlarge the Field of Truck Transportation

By JOHN B. MANSFIELD,
President, Detroit Trailer Co.

Detroit, July 17.

RECOGNITION by truck companies of the importance of trailers in developing the greater possibilities of highway transportation promises to bring the trailer manufacturer into a prosperous era.

For a long time the truck and trailer manufacturer traveled individual paths owing to the feeling that the use of trailers reduced the field for truck business. In the recent past, however, this feeling has given way to the extent that two of the largest truck companies are now building tractors designed for use with trailers and at least one other big company is on the point of doing so.

This development is a natural one as by using trailers the surplus power of the truck engine can be employed to the advantage of the truck owner. Legislation against the excessive weights of truck loads made this development certain to come. With trailers the full power of the engine can be used in hauling loads so spread that the weights on tire surface do not exceed the legal limit.

That the trailer provides the means of establishing road transportation as more economic than rail, especially in short haul work, is shown by the results attained by companies operating out of Detroit. Deliveries of material are being made in express time at less than freight rates. Owing to the speed of deliveries, bills for material are sent with loads, and are delivered with them in faster time than they could be delivered through the mails.

Use of trailers permits the loading and unloading of material to be carried on independent of the operation of the tractor, which merely picks up the trailer when it is loaded and leaves it to be unloaded at its destination. Return loads can be made quickly on ordinary length trips and all the delay incident to waiting for the loading and unloading of the operating vehicle is eliminated.

South American business in trailers promises to be large, as the lack of railroad facilities makes highway transportation necessary to the development of inland territory. Brazil is spending \$1,000,000 for highway construction on which it will transport material into the interior and bring back the products of the country. They have taken the position that highway building is cheaper than railroad construction and operation. One fleet of trucks and trailers is now furnishing transportation 200 miles into the interior for goods entering and leaving the country.

To permit the operation of trailers in connection with trucks, the truck manufacturers should provide equipment that will enable the two to be employed successfully. There can be no question of the importance of the trailer business to truck makers and the development of highway transportation can be greatly speeded by co-operation between the two forces.

Jewett Adds Coupe and Roadster Models

DETROIT, July 17—The Paige-Detroit Motor Car Co. has added a roadster and coupe to its Jewett line and is now in production on them, rounding out the line to four models, the touring car and sedan having been in production. The roadster is priced at \$1,065, same as the touring car, and the coupe at \$1,395 is the same as the sedan.

The coupe is a four-passenger vehicle with a large, roomy body, the collapsible seat at the driver's right disappearing completely under the dash. A feature of the collapsible seat is that it has an arm rest which is matched by an arm rest set in the door. The roadster, while nominally a two-passenger vehicle, can accommodate three. Its construction is featured by a maintenance of the high stream line to the rear, permitting of a large deck for the carrying of luggage or sample cases. Both models are mounted on the regular Jewett chassis.

Jewett production is declared by the factory to be running behind orders, and

special efforts are being made to meet the demand for closed models. Sales on this line are being pushed somewhat.

Liberty to Add Two New Models to Line

DETROIT, July 17—The Liberty Motor Car Co. is making some changes in the appearance of the cars without changing the mechanical construction to any extent. Steel disk wheels have been made standard equipment on the touring model and they will be finished in deep blue striped in harmony with the body color.

A newly designed filler cap and water indicator have been added and the upholstery is now done in the smooth style, eliminating tufts and pleats. The Cavalier touring models will be furnished in three standard body colors each matched with appropriate upholstery. Two new models, a four-passenger speedster of the Cavalier type, and a two-passenger closed car, to be priced at very little more than the open Cavalier type, will be disclosed soon.

No Cuts Made Yet in Tire Production

**Akron Plants Still at Peak—
Dealer Sales Running High
—Output Past Peak**

AKRON, OHIO, July 17—With one or two minor exceptions, the rubber industry continues at the production peak reached late in June. It is reported semi-officially that production has been decreased slightly by the Goodyear Tire and Rubber Co. during the past two weeks, but output has been larger at Goodyear than has been indicated by the official statements, and more than 26,000 tires a day still are being made.

The other factories, while not actually making any decreases, have practically ceased making increases, indicating that the crest of the season's sales has passed and that the next move will be downward, primarily because of the reduced buying of tires for original equipment by automobile manufacturers.

Consumer Sale Maintained

The dealers' sales probably will continue through this and the coming month, according to leading authorities, which means that those factories depending upon the consumer trade will not be compelled to slacken production during the next two months at least.

Tire production thus far this year has been greater in units than ever before in the history of the industry, and it is now estimated that the industry will produce at least 33,000,000 tires in America this year as compared with a previous peak production of 32,400,000.

The monetary return to the rubber companies is greatly reduced, however, because of decreased prices, but it is asserted that the first six months have shown substantial profits for most of the companies here. Even some of the smaller concerns, which suffered during the depression more than the larger manufacturers or which were reorganized completely, now state that production is on a profitable basis.

Tire Fluctuation

Unsettles Market

(Continued from page 137)

of new brands of tires to meet the keenest possible competition cannot be obtained at the large factories, but dealers report they are being flooded with announcements regarding the new lines.

Some of the industrial leaders have practically confirmed the report privately, although all hesitate to make any statement for publication permitting the use of the company name. Since its inception, the tire industry has operated on a quality basis and makers are reluctant to admit a change to a purely price basis.

An official of one large company stated privately that the cheap tire business had

become necessary because of the large demand for original low cost equipment and to use up some of the high cost raw materials which still remain on hand.

The tendency has been downward in price and quality during the past year. Last year cut followed cut in the tire field. This year special discounts and quiet reductions have replaced the out and out reduction, while the manufacture of low cost cord tires in fabric tire sizes have pointed the way to lower cord prices as well as lowered quality in this field.

Goodyear Will Enter French Tire Market

PARIS, July 10 (*By Mail*)—Goodyear has just come on the French market with a central organization in Paris established by the Goodyear Tire & Rubber Export Co. Charles G. Jerosch, who is in charge of the French organization, has his headquarters in the Rue de Ponthieu.

A French joint stock company has been formed and will take care of all France, Belgium, and some other portions of the Continent of Europe. Goodyear has had under consideration for three or four years the advisability of coming on the French market, and now that a decision in favor of this move has been taken the campaign will be of a competitive nature. It is understood that the French Goodyear company will interest itself in racing and competition work, owing to the high degree of importance attached to speed contests in France. The French market will be supplied from the Canadian factory.

MASON TIRE PRICES DOWN

AKRON, JULY 17—The Mason Tire & Rubber Co. announces price reductions averaging a little more than 25 per cent on all sizes of cord tires. The 30x3½ clincher has been cut from \$18.75 to \$13.95 and a new straight side 30x3½ line has been added at \$15.85. The company also has cut its prices on fabrics in Ford sizes. The 30x3 has been reduced from \$11.90 to \$9.25 and the 30x3½ from \$13.50 to \$10.60. These reductions bring the Mason prices into line with those previously established by the other large companies.

GEORGIA FIGHTS TRANSPORT BILL

ATLANTA, July 18—The Georgia Motor Bus & Transportation Association, which includes in its membership not only operators of motor bus and freight lines, but also truck and passenger car dealers, will carry on a campaign of education, in an effort to show the public and the state legislature the advantage of motor transport. The main purpose of the campaign will be to defeat a bill presented to the legislature by railroad interests, under which the bus and freight lines would be made common carriers subject to the same rules and regulations as the railroad and under the jurisdiction of the state railroad commission.

Goodyear to Build Semi-Rigid Dirigible

**Government Contract Calls for
Biggest Airship Yet Made
in America**

AKRON, OHIO, July 17—The Goodyear Tire and Rubber Co. during the past week received contracts from the Federal government for one semi-rigid and three non-rigid dirigible airships. The new order follows closely the receipt of a contract of similar size early this summer.

The semi-rigid dirigible ordered will be the first of its kind to be manufactured in the United States and will be the largest ship thus far built by the company.

Displacement of more than 750,000 cubic feet of air is provided for in the specifications, and the speed will be so great that it is expected to reduce the present record from England to Mineola by more than 60 hours.

Helium to Be Used

In the construction of the semi-rigid and the other ships just ordered, all the improvements which have been incorporated in aircraft by the company will be included. Among the improvements are the building of the engines in the cockpits, installation of gears by means of which the propellers can be disconnected and reversed, making for easier handling, radiator cooling devices and innovations looking toward easier escape from the ship in case of accident. The new ships will be built to be inflated with helium, however, which practically insures their inflammability. According to the contract the semi-rigid ship will be completed late in 1923.

FOKKER MAKES PROPOSITION

MILWAUKEE, WIS., July 17.—The board of directors of the Milwaukee Association of Commerce, after a series of conferences with A. H. G. Fokker, the noted European aircraft designer and engineer, intimated that it is likely that Milwaukee will be able to meet conditions imposed by a proposition for the establishment of an American aircraft enterprise. New York, Chicago, Dayton, Columbus, and other cities are also engaged in consideration of the Fokker proposition.

CLOSED CAR SPACE TAKEN

NEW YORK, July 17—Virtually all space available in Grand Central Palace has been sold for the closed car show of the Automobile Merchants Association of New York, which will be held September 23 to 30. This is the first time the Metropolitan dealers have attempted anything so elaborate as a closed car show in the Palace, scene of the mid-winter show conducted by the National Automobile Chamber of Commerce.

Metropolitan Sales Record Is Amazing

Registrations Tell Story—Dealers Report Seasonal Decline Under Normal

NEW YORK, July 17—Registrations of new automobiles for ten counties in and around New York City numbered 9,068 in June as compared with 9431 in May and 9290 in April. Registrations for the year up to date are 39,579 as compared with 24,577 for the first six months of 1921.

The June registration report as compiled by Sherlock & Arnold, publishers of the Automobile Sales Analysis, shows that eight cars have what might be termed a considerable lead over their competitors in the high priced class, while in the medium and low priced classes five cars are far ahead of the field and ten others well in the lead of those following.

Seasonal Decline Slight

A summary of registrations for the first six months in the high and medium and low priced classes follows:

	High Price	Medium and Low Price
January	283	2,017
February	273	2,231
March	632	6,354
April	862	8,428
May	961	8,470
June	865	8,203
Total	3,876	35,703
Total (1921)	2,491	22,086

Distributors and dealers in the metropolitan territory have gone almost a week past the middle of July without feeling what might be termed a real slump in passenger car sales. The June selling record, of course, is not being equalled, but orders in the majority of establishments are running above what the trade has expected and the seasonal decline is so slight that it would hardly be termed normal up to this time.

Dealers are beginning to get recapitulations on the first six months' business and in some cases results have been little short of amazing. One distributor handling a car outside of the first 15 had a retail sales record in New York for the first four months of the year which ran far ahead of the entire year 1921, and sales for the first six months were 275 per cent of all of 1921.

Shortage of Closed Cars

More than a dozen distributors and branches could easily be found on Broadway with sales of the first six months running 100 to 150 per cent of the total of 1921. There is still a shortage of cars with several of the dealers in the fastest selling lines. Others are suffering from a shortage of closed cars owing to a demand for these models which is running ahead of factory expectations even for the metropolitan territory.

The low-priced closed jobs, including those with soft tops, have been in heavy demand right along. Such cars as Hud-

son and Essex coaches, the Nash cariole, Hupmobile coupe-roadster and the Dodge Brothers business coupe have been selling heavily and distributors are far behind on deliveries. The territory is in good shape on used cars, generally speaking.

The used car market has fallen off since the latter part of June, but stocks have not even approached an alarming stage and expected care in trading from now on probably will prevent anything resembling a crisis, provided business holds reasonably good throughout the year.

It is significant that several cars which are not in the first 10 or 15, nationally speaking, have had remarkable sales records in New York this year. Intensive selling methods by the organizations distributing these cars has put them up front. Telephone canvasses, special "closing" men and other aggressive selling features have brought about this result with these organizations.

More State Sales Analyses to Come

NEW YORK, July 19—Publication monthly of new car registrations for the entire State of New Jersey has been undertaken by Sherlock & Arnold of this city, publisher of the *Automobile Sales Analysis*, which covers the same information for ten counties in and around New York City. In New Jersey the publisher will record not only passenger car, but motor truck registrations, and for the convenience of distributors and dealers, some of whom are in the New York territory and others operating in Philadelphia, the report will be published in two sections, one for thirteen counties of north New Jersey and the other for eight counties in south New Jersey. The publisher expects next to undertake a compilation of registration information in Pennsylvania, and eventually hopes to have records for upward of fifteen states which, combined, would give an accurate indication of sales conditions throughout the country.

CANADIAN FORD MELON

DETROIT, July 17—The Ford Motor Co. of Canada has declared a cash dividend of 15 per cent, payable July 20 to stock of record July 15. Stock of the company which sold at 260 in January has passed 440. The company has had cash on hand exceeding \$10,000,000 when its current needs were not more than \$3,000,000.

DANIELS TO DOUBLE OUTPUT

READING, PA., July 17—The Daniels Motor Co. has made plans to double its production beginning Sept. 1. It is expected that the closed car business will be larger than ever as the fall season approaches. The Daniels company will be in a position to meet this demand, as it builds all its own bodies, and has felt no shortage.

Milwaukee Plants Running Top Speed

Heavy Demand for Parts Keeps Up—Dealer Territories May Be Cut

MILWAUKEE, WIS., July 17—Manufacturers of automotive parts continue to keep busy at the high point of capacity reached recently, the demand from passenger and commercial car builders being well sustained and shipping directions absorbing output from day to day. Greater interest among tractor builders is apparent, and it is felt that present schedules doubtless will be kept in effect for at least three months.

Passenger car manufacturers in this district are working at the heaviest capacity possible, in view of the still existent shortage of bodies, open as well as closed, and the inadequacy of supply of some other important elements.

Automotive equipment is moving so well through jobbers' and dealers' hands that manufacturers are unable to get production to an equality with delivery specifications. This refers both to car manufacturers' equipment and specialties for the owner trade. The call for bumpers is the largest on record, and this piece of equipment is selling more rapidly than it can be produced.

Retail sales in the first half of July again represented a handsome gain over the same period in 1921, although a good many dealers say that volume is not so large as in the same periods of the months of May and June.

Contract Season On

For distributors, this season is an especially busy one because many contracts are pending. This year, it is intimated, the new contract season is accompanied by somewhat larger problems than usual. While none of the distributors are ready to talk, reports are current that car manufacturers are gradually effecting a change in merchandising policies whereby a slicing of territories is involved. In other words, it is said that some of the larger territories are to be split up and some distributors will have to take much more restricted areas on the distribution basis than they have held for many years past.

So far as this territory is concerned, the bulk of distributor contracts are written to embrace the geographical unit of the state of Wisconsin plus the Upper Peninsula of Michigan.

DETROIT WORKERS INCREASE

DETROIT, July 17—Members of the Employers Association report the addition of 200 men to their payrolls last week. The total now is 181,560, compared with 108,000 in the same week of 1921 and a total of 186,000 in the same week of 1920.

Pierce Announces Drastic Reductions

Price Cut on Open Models, \$1250
—Closed Cars Dropped
\$1200 to \$1500

BUFFALO, July 17—The Pierce-Arrow Motor Car Co. announces substantial reductions in the prices of all its passenger cars. The list follows:

	Old Price	New Price
Runabout	\$7,000	\$5,250
4-pass. Touring	6,500	5,250
7-pass. Touring	6,500	5,250
Brougham	8,000	6,800
Landaulet	8,250	7,000
4-pass. Sedan	8,250	6,900
Coupe	8,000	6,800
7-pass. Sedan	8,500	7,000

The reduction of \$1,200 in the price of the coupe and \$1,500 in the price of the sedan are significant of the sharp downward trend in closed car prices.

INTERNATIONAL REDUCTIONS

CHICAGO, July 15—Price reductions on three truck models have been announced by the International Harvester Co., effective July 8. The models and prices follow:

	Old Price	New Price
Speed truck (2000-lb. capacity)	\$1,500	\$1,250
Model 21—1-ton	1,750	1,550
Model 31—1½-ton	1,850	1,650

STANLEY REVISES PRICES

NEWTON, MASS., July 18—The following price changes have been announced by the Stanley Motor Carriage Co., affecting its entire line of models:

	Old Price	New Price
2-pass. roadster	\$2,800	\$2,700
5-pass. phaeton	2,600	2,700
7-pass. phaeton	2,600	2,700
Sedan	3,850	3,950

MONROE PRICES HIGHER

INDIANAPOLIS, July 18—An increase in price of the Monroe affecting both the roadster and 5-passenger phaeton has been made by the William Small Co. as follows:

	Old Price	New Price
2-pass. roadster	\$875	\$950
5-pass. phaeton	875	950

BECK-HAWKEYE REVISION

CEDAR RAPIDS, IOWA, July 17—The Beck-Hawkeye Motor Truck Works has made the following price revisions on three of its models:

Model	Old Price	New Price
1½-ton	\$2,050	\$1,725
2-ton	2,150	1,810
2½-ton	2,850	2,395

KLINE PRICES DOWN

RICHMOND, VA., July 17—The Kline Car Corp. has cut price of its two, five and seven passenger touring cars from \$1,970 to \$1,690. The coupé has been reduced from \$2,850 to \$2,750 but no change has been made in the price of the sedan.

HARDING WANTS UNITED STATES TO LEAD WORLD IN COMMERCIAL AVIATION

NEW YORK, July 17.—The Aeronautical Chamber of Commerce of America has received a letter from President Harding prophesying in the near future amazing development in air travel, both transportation and communication. The Chief Executive believes that each stage of progress demands improved means of transport, and he wants the United States to lead the world in commercial aviation.

His letter follows:

"The White House,
"Washington.

"Gentlemen:

"I find pleasure in adding a word expressive of my interest in aerial transport, and in the presentation of the subject which is being made by the Aeronautical Chamber of Commerce. The history of civilization is largely the history of communication. Each stage of progress seems to demand and develop improved means of transport. The steamship, the railroad and the motor car have been devised and utilized. Now we enter a new phase. It is a real distinction to America to be known as the birthplace of the airplane; it should be our concern that this art shall not languish, but that in its practical application we shall lead the world. An amazing development will take place in the near future in the utilization of the air as a medium of transport and communication. As a government, we are aiming to provide this art with necessary guaranties of law, and with such facilities as may be possible through the encouragement of airways and terminals. But for air transport quickly to achieve the important place it is destined to occupy, it must have public interest and support. I hope your efforts in this behalf may be productive of most gratifying results.

"Very truly yours,
"Warren G. Harding."

"Aeronautical Chamber of Commerce of America, Inc.
"501 Fifth Avenue, New York City."

INCREASE ON DAVIS

RICHMOND, IND., July 15—The Geo. W. Davis Motor Car Co. has announced an increase in price of \$100 on its model 71, 5-passenger phaeton, the new price being \$1,295.

NEW EARL MODEL

JACKSON, MICH., July 14—Earl Motors, Inc., has announced a new closed job, a four-passenger car, called the Cabriolet, the price of which is \$1,395.

LAFAYETTE RAISES PRICES

INDIANAPOLIS, July 17—Lafayette Motors Co. announces an increase in the price of its coupe from \$5,000 to \$5,500 and of its sedan from \$5,175 to \$5,500.

REVISE TOWER TRUCK PRICES

GREENVILLE, MICH., July 17—Price revisions made by the Tower Motor Truck Co. follow:

Model	Old Price	New Price
1½-ton	\$2,900	\$2,000
2½-ton	3,200	2,475
3½-ton	4,100	3,475

CUTS TRACTOR PRICES

MANSFIELD, OHIO, July 17—The Aultman & Taylor Machine Co. has cut the price of its 15-30 tractor from \$2,200 to \$1,900; its 22-45 tractor from \$3,400 to \$2,800 and the 30-60 from \$4,500 to \$4,000.

HUBER REDUCES PRICE

MARION, OHIO, July 3—The price of the light 4 tractor manufactured by the Huber Mfg. Co. has been reduced from \$1185 to \$985.

WATSON TRUCK CUT

CANASTOTA, N. Y., July 14—The Watson Products Corp. announce a price reduction on their 1-ton speed wagon, the price being cut from \$1865 to \$1465.

BANKRUPTCY FOR RED ARROW

PETERBORO, ONT., July 17—Stockholders of Red Arrow Tires, Ltd., have decided to make an assignment in bankruptcy. Because of the resignation of directors, those remaining on the board were without a quorum, and President Turner said that they were more or less in the dark about the financial situation of the company. The stock was underwritten by the Peterboro Securities Corp. The principal asset is the partly completed plant.

CANADIAN REGISTRATIONS GAIN

WASHINGTON, July 18—Canadian automobile registration in 1921 totaled 463,848 cars, representing an increase of 48,264 cars over the previous year and represents an average of one automobile for every 19 persons. Revenues for registration amounted to \$7,669,493, practically all of which was expended for road improvements.

Commission Charges Gasoline Monopoly

Federal Trade Board Would Prohibit Standard Oil Interlocking Stock Ownership

WASHINGTON, July 17—Asserting that a "monopolistic situation" with respect to the gasoline market prevailed over the entire country, due to the fact that an interlocking stock ownership in the several Standard Oil companies "has perpetuated the very monopolistic control which the court sought to terminate," the Federal Trade Commission recommended in a report to Congress to-day the enactment of legislation prohibiting "common stock ownership in corporations which have been members of a combination dissolved under the Sherman law."

Giving the results of an inquiry made on the complaint of the Montana State Railway Commission regarding gasoline prices, the commission reported that although the prices of high-grade crude petroleum were lower in Montana and Wyoming than in any other crude producing states, the refinery prices of gasoline and kerosene were "much higher than at midcontinent refineries."

"The unsatisfactory situation in Montana and adjacent Rocky Mountain states," the report said, "is evidently due to the fact that the oil trade in this region is practically monopolized by Standard Oil interests."

Monopolistic Control

"To-day the entire country is divided into eleven standard gasoline marketing territories in which a standard marketing company is the dominating factor and in which there is no real competition between the various standard units. This monopolistic situation is possible under the terms of the Standard Oil dissolution decree, by which the different Standard companies are, for legal purposes, supposed to be strangers to each other, but there is, as is generally known, an interlocking stock ownership in the different organizations, which has perpetuated the very monopolistic control which the court sought to terminate."

"The commission is of the opinion that this situation cannot be effectually remedied by existing law and that adequate relief can only be secured through additional legislation. It recommends, therefore, that Congress pass a law prohibiting common stock ownership in corporations which have been members of a combination dissolved under the Sherman law."

KNOX TIRE SALE APPROVED

MT. VERNON, OHIO, JULY 17—Sale of the Knox Tire & Rubber Co. to stockholders has been approved by Federal Judge Sater. The purchase money has been paid in full, and all objections to the confirmation were overruled.

EARL MOTORS SEEKS MYSTERIOUS AGENT

JACKSON, MICH., July 17—Earl Motors, Inc., has asked the police authorities out of the state for assistance in locating a mysterious stranger giving the name of Branigan who has called on several Detroit concerns and placed fictitious orders for material which Earl Motors does not want and cannot use. For example, he ordered from the Detroit Awning Co. a full set of awnings for Earl Motors' new building, which does not exist, except in his brain. He asked immediate shipment of 900,000 yards of gravel from the United Fuel and Supply Co. He also placed "orders" for advertising and ordered 10,000 menu cards from a printing house. Earl Motors is at a loss to understand the purpose of "Mr. Branigan's" activities.

Slight Slowing Up in Some Sections

(Continued from page 136)

these trucks will be brought into the country unless Congress passes the Graham resolution which would impose a prohibitive re-import duty.

Any forecast of production for the remainder of the year is complicated by the fact that a serious freight blockade on the railroads seems certain to follow the resumption of coal carrying together with the grain harvest which must be moved in a short time. With an unprecedented amount of equipment in bad order because of the shop men's strike, it appears inevitable that the carriers will be unable to handle the volume of miscellaneous freight which will be offered them during the third quarter.

FORD PROPOSAL TO SENATE

WASHINGTON, July 17—The Senate Committee on Agriculture has rejected by vote of 9 to 7 Henry Ford's offer for the purchase and lease of the government projects at Muscle Shoals, Ala. Notwithstanding the adverse vote, the Ford proposals will be presented to the Senate for final decision through minority reports.

NEW N. M. A. HEADQUARTERS

WASHINGTON, D. C., July 18—The National Motorists Association has opened headquarters in this city in the Edmonds Building at 911 Fifteenth St., N.W. A touring and information bureau has been established, the use of which is extended to all tourists.

G.M. Produces Three New Truck Tractors

Company Claims Trailer Combinations Will Comply with Highway Weight Laws

PONTIAC, MICH., July 17—Three new models of truck tractors have been placed on the market by the General Motors Truck Co. The tractors are designed to haul semi and full trailers carrying a load as high as 15 tons. Claims are made for the tractor-trailer combination by the company that there are many instances where transportation costs can be reduced as much as 50 per cent and will enable a concern to transport goods over any state highway with a load as high as 15 tons without violating any state laws governing truck loads. This is accomplished by so designing the tractor and trailer combination that the load is distributed evenly over from six to eight wheels, which will comply with state laws governing pounds per wheel truck load.

The new tractors are to be put out in 5, 10 and 15 ton models. The standard General Motors truck design is the foundation for the tractors, the necessary equipment and departure being made to take care of the trailer and semi-trailer attachment. The company is using the heavy-duty powerplant in the manufacture of these units, and standard equipment will include the convertible cab and odometer.

	Price Complete	Wheel-Base In.	Axle Ratio	Rear Tires In.	Turning Radius Ft. In.	
5-ton	\$2,650	127	8.5:1	8	21 3/4	R L
10-ton	3,900	138	10.3:1	12	22 3/4	R L
15-ton	4,250	138	11.6:1	14	22 3/4	R L

Nash Shows Greatly Increased Earnings

KENOSHA, WIS., July 17—Earnings of the Nash Motors Co. from Dec. 1 to April 30 were \$2,173,000 as compared with \$2,226,000 for the full fiscal year of 1921. The balance sheet of the company as of April 30, last, follows:

Assets: Real estate, plant, equipment, etc., \$4,847,828; investments \$2,114,112; Liberty bonds \$1,200,802; materials and supplies \$3,334,388; notes receivable \$527,896; accounts receivable \$2,129,154; cash \$8,204,122; U. S. Treasury certificates and notes, \$5,857,588; prepaid expenses \$3,888; total \$28,219,778.

Liabilities: Preferred stock \$4,000,000; common stock, 54,600 shares of no par value, \$510,000; accounts payable \$2,710,902; reserve for Federal and other taxes \$3,285,662; other reserves \$2,808,106; surplus \$14,905,108; total \$28,219,778.

The surplus of \$14,905,000 is equivalent to \$273 a share on the 54,600 shares of common outstanding.

Business Is Better All Over Country

Packard Gets Optimistic Reports in Response to Questionnaire Asking Conditions

DETROIT, July 15—Five hundred inquiries on business conditions by the Packard Motor Car Co. in as many sections of the country brought back the response that the general outlook is improving all the time. The inquiries were directed to dealers, bankers, state officials and others, and with few exceptions, declared for perceptible gains over former conditions.

In Kansas City and Omaha there was a somewhat pessimistic tone to be observed from the responses, but this was due rather to conditions as they have existed than to prospective conditions. The banking situation there has left a bitter taste with dealers, and the prospects of bumper crops and better prices has not eradicated it.

South Gaining Steadily

J. E. Bouden, Jr., president of the Whitney Central National Bank, New Orleans, said business is improving rapidly. Crops promise to be excellent, he said, were planted at low cost and from present indications will bring good prices.

Robert F. Maddox, president of the Atlanta National Bank, Atlanta, Ga., and former president of the American Bankers' Association, said bank deposits show increases, money is easy and business outlook is cheerful.

Edgar T. Bell, farm statistician, Oklahoma City, Okla., reported Oklahoma farmers will raise \$30,000,000 on their wheat alone this year.

"We expect a continued improvement in business," said M. N. Avery, vice-president of the Security Trust and Savings Bank, Los Angeles, Cal. He said labor is well employed at good wages, crops are abundant and there is a gradual increase in bank deposits.

J. W. Spangler, president of the Seattle National Bank, Seattle, Wash., said business conditions throughout the Pacific Northwest are gradually improving in substantially every line, with prospects for a continued betterment.

Prosperity for Farmer

Samuel R. McKelvie, Governor of Nebraska, predicted a big era of prosperity in his State. "I believe," he said in a telegram, "that there lies ahead of the farmer an era of sustained prosperity which, in turn, will insure general prosperity."

T. W. LaQuatte, Des Moines, Iowa, sent word that there is no reduction in acreage, cost of farm production is reduced, surpluses are disappearing and crops and prices point to great prosperity for farmers of the State.

A report from Denver was that conditions are steadily improving, with good mercantile business, good prospects for crops and increasing bank deposits.

Clearing house banks in Boston, the National Shawmut Bank reported, show increased deposits of \$50,000,000 in the last three months.

Banks in Philadelphia agreed that business conditions there are improving, with indus-

STOCK YARD MOTOR TRANSPORT GAINS

OMAHA, July 18 — Statistics from the South Omaha stockyards show that motor transportation of stock to the yards for June, 1922, was the highest of any previous month. Figures are as follows:

	1921	1922	Gain
Cattle.....	3,272	3,817	545
Hogs.....	23,676	29,056	5,380
Sheep.....	5,700	15,713	10,013

tries, except shipbuilding, making a better showing each day.

The Continental and Commercial Bank of Chicago says a new business cycle has begun with business barometers indicating the beginning of a slow expansion.

Unemployment in New York is steadily decreasing, said a report from New York after interviews had been obtained with heads of a number of banks, business men and manufacturers. Bankers said that generally speaking adjustment of prices among commodities and industries is reaching a more normal relationship. Volume of output in practically all basic industries is showing a steady increase from month to month, they added.

J. D. Ayres, vice-president of the Bank of Pittsburgh, said the steel industry now is operating at about 80 or 85 per cent of normal. There is little unemployment outside of the coal industry and business conditions generally are good and growing better, he said.

Iowa Buying Well; Farmers Pay Cash

DAVENPORT, IOWA, July 18—The Iowa farmer is buying nearly as much machinery now as he did before the war and far more than since the close of the war, according to implement dealers, who report that cash sales are almost universal — greater cash transactions even than were recorded in most prosperous war-times.

International Harvester Co. distributors summarize the trade conditions by stating that the farmer is "buying what he needs and buying it more intelligently by far than during the war period." Emerson-Brantingham Implement Co. representatives claim a 500 per cent increase in business over last year with prospect that the summer months' reports will be even greater. Twin-City Machinery Co. reports "eight to ten times as much business as a year ago. Southwest Iowa, usually lagging behind the state in sales, has been our best territory. We are doing practically 100 per cent cash business, which is another thing that has surprised our force."

DORRIS JUMPS PRODUCTION

ST. LOUIS, July 17—Simultaneously with the reduction of prices the Dorris Motor Car Co. has increased its production schedule and proposes an aggressive selling campaign.

Ford's June Sales Set New High Mark

Total of 148,439 Announced —
Report for First Half Year
Shows 652,251

DETROIT, July 17—Sales of Ford cars, trucks and tractors established a new record in June with a total of 148,439, an average of 5709 a day. Sales by the Ford company of Canada were 6054 and 9435 were sold by the European and South American branches.

With the closing of business for June, records showed that the total sales for the six months of 1922 were 652,251, which is materially ahead of any previous half-year record.

July Ford sales are expected to equal and probably exceed those of June. Schedules have been fixed at 151,767, although dealer orders call for more than 200,000. The company has been unable to keep pace with the demand for closed models.

Ford truck sales up to this time show an increase of 84 per cent over last year.

Ford now is employing 75,000 men in Detroit.

Prizes for Essays on Highway Safety

NEW YORK, July 17—Prizes aggregating \$6,500 for the best essays written by school children and teachers on Safety in Highway Traffic, are announced by E. S. Jordan, chairman of the special committee representing the National Automobile Chamber of Commerce.

There were 500,000 contestants in the contest last year. School teachers will be awarded \$1,500 of the prize money and the remainder will go to their pupils. Direction of the contest will be under the direction of the Highway and Highway Transport Education Committee at Washington, which will supply information regarding it.

In a statement regarding the contest, Jordan says that it is not too much to hope that 1922 will see the number of automobile injuries cut in half. While many estimates have been made of the annual total of automobile injuries, he contends that the correct figure is not over 325,000. The number of motor fatalities in 1921 was 12,500.

BUS OWNERS MUST BOND

OMAHA, July 17—The railway commission of Nebraska is endeavoring to get the names of all automobile bus owners in the state, with a view of forcing them to appear before the commission and show cause why they should not put up a bond sufficient in size to guarantee at least \$5,000 liability on every passenger carried.

Men of the Industry and What They Are Doing

Wiggins Joins Holt Tractor

E. R. Wiggins, Moline, Ill., has been appointed chief of the sales engineering department for the Holt Tractor Manufacturing Co., East Peoria, Ill. He will investigate Holt tractors in the field and submit a report upon their condition and performance. For many years he was connected with the Deere Plow Company of Moline and became a contributor of technical subjects in relation to power farming to many periodicals. Since 1918 he has been connected with the Chilton publications of Philadelphia.

Willoughby and Taylor on Road

David J. Willoughby, sales manager of the Columbia Motor Co., and Norman I. Taylor, sales manager for the Albee corporation, advertising counsel for the company, are on a business trip through the middle west on which they will hold dealer and distributor meetings in eleven cities.

Changes in Star Rubber

Changes in personnel in the sales department of the Star Rubber Co. have been announced during the past week. Arthur G. Shirk, formerly with the Good-year Tire & Rubber Co., has been named assistant sales manager. C. E. Armstrong has been given eastern territory. L. I. Ris, formerly with the company, has been placed in charge of sales in New England and eastern states. C. A. Reece has been placed in charge of sales promotion.

McQueen Heads Sales Promotion

B. F. Goodrich Co. announces that L. A. McQueen, formerly assistant to E. D. Gibbs, advertising manager has been placed in charge of a newly created sales promotion department. The vacancy left in the advertising department will not be filled until later in the year according to official announcement.

Griffins to Handle House Organ

Frank Griffins will probably be placed in charge of a new factory paper which is being planned by the Seiberling Rubber Co. The proposed factory paper will bind the employees of the company's plant at Barberton and New Castle more closely together.

Pardee Leaves C. I. T.

The resignation of C. L. Pardee, Jr., who for the past two and a half years has been credit manager of the Commercial Investment Trust of New York became effective July 15. Pardee has been connected with automotive financing since 1916 and prior to his connection with the C. I. T. was assistant credit manager of the Continental Guaranty Corp., New York and the Guaranty

Banking Corp., Chicago. It is understood that, after a few months' vacation, he is planning constructive sales-credit work for one of the manufacturers to insure the extension of proper credit facilities to their dealers.

Zumstein Succeeds Cobb

W. E. Cobb has resigned as New York branch manager of Master Trucks, Inc., Chicago, being succeeded by T. B. W. Zumstein, formerly vice-president and sales manager of the Gary Motor Truck Co.

Mitchell Advances Fiskien

Clarence P. Fiskien of Racine, Wis., has been appointed general manager of the Wisconsin sales division of the Mitchell Motors Co. under the reorganization of the sales department of the factory by A. G. McMillan, general sales director. Mr. Fiskien's headquarters will be at the factory in Racine. He was formerly manager of the Wisconsin branch of the Burroughs Adding Machine Co., resigning some time ago to join the Mitchell sales organization. He is a director of the Racine Chamber of Commerce and engaged also in some notable civic projects.

Appoints Assistant Sales Managers

E. L. Smith and C. H. Bliss have been appointed assistant sales managers of the Nash Motors Co. Smith leaves the position of district manager of a large automobile concern having headquarters in St. Louis to join the Nash organization. Bliss has been with the Nash company since its organization.

Odlin Leaves Wickwire-Spencer

John W. Odlin, advertising manager for the Wickwire-Spencer Steel Corp., has resigned to take effect Sept. 1 to become head of the John W. Odlin Co., advertising agents. The headquarters of the new concern will be in Worcester and the New England states will be covered specializing in manufacturers' advertising.

Barker Sails for Europe

Arthur E. Barker, vice-president in charge of sales of the Maxwell Motors Corp., and Chalmers Motor Corp., sailed this week for Europe on a six weeks' vacation trip, on which he is accompanied by Mrs. Barker.

Willard Again Vice-President

Frank H. Willard has been elected vice-president and general manager of the Graton & Knight Mfg. Co. by the directors. Willard has been with the concern for thirty years and was formerly vice-president and a director but

resigned from office, remaining connected with the organization, at the time of reorganization a few months ago.

Kemp and Farley Promoted

A. P. Kemp has been appointed president and treasurer and J. I. Farley has been appointed first vice-president of the Auburn Automobile Co., Auburn, Ind. Kemp will continue in the capacity of general manager which he held before his new appointment. Farley will continue as director of sales in addition to his new duties. Kemp succeeds Morris Eckhart.

Walter Retained by King

Maurice Walter has been retained as consulting engineer for the King Motor Car Co. of Detroit. Walter will also continue in his present capacity as chief engineer of the Walter Motor Truck Co., New York City.

Ricker Joins Duesenberg

Chester S. Ricker of Indianapolis has been appointed general manager in charge of plant operation for the Duesenberg Automobile & Motors Co., Inc. This appointment relieves L. M. Rankin, vice-president of the company, from all duties in connection with production. Ricker has been acting as consulting engineer for the organization for some time past and previously in consulting capacity with the Lexington Motor Co., Ansted Engineering Co., Midwest Engine Co. and Nordyke & Marmon.

Landsittel Goes with Fox

C. H. Landsittel has joined the Fox Motor Car Co. of Philadelphia in the capacity of purchasing manager. Landsittel was previously connected with the Haynes and Templar organizations in a similar capacity.

Triphagen to Reo Factory

Clarence E. Triphagen, for the past three years manager of the Detroit branch of the Reo Motor Car Co., has been called to the factory to become identified with the sales division under R. C. Rueschaw, sales manager. Triphagen had been connected with the factory sales force formerly, and before going to Detroit was manager of the Lansing factory branch.

SUDDEN GAIN IN SALES SEEN

KANSAS CITY, July 18—Business in Oklahoma and Kansas City has shown a marked improvement in the past few weeks. Dealers believe that a decided change for the better will come soon and continue until the colder weather arrives. Farmers are investing in cars.

Harvesting of the wheat is almost finished, and the fruit crop is good.

Trucks Will Serve If Strike Compels

N. A. C. C. Gathers Motor Transport Data—Post Office Already Using Trucks

NEW YORK, July 18—The Motor Truck Committee of the National Automobile Chamber of Commerce is gathering data from all parts of the country on the number of trucks available for service in handling food and other essentials if the railroad strike disrupts rail transportation. Statistics on file show that there are in the country 935 organized motor transport companies operating fleets of trucks.

The situation in New York, in case rail deliveries of food stuffs fail, will be in charge of a committee of twenty-four under the leadership of General George W. Goethals, which was appointed when a general railroad strike was threatened last October. All members of this committee are ready for work excepting Health Commissioner Copeland who is in Europe but who will be in direct charge of food distribution if motor truck deliveries become essential.

It is estimated that there are in New York 57,000 motor trucks which could be mobilized and operated under the direction of the Port Authority if the need arises. This huge fleet would be adequate to handle food supplies in the usual quantities for sixty days and could keep the city from starvation indefinitely if it were placed on a siege basis and food rationed to the people.

Mobilize Trucks to Carry Mails

WASHINGTON, July 15—Actual transportation of mail by motor trucks, incident to the railroad strike was begun by Postmaster General Work with the inauguration of service between Bedford and Swiss City, Ind. This is the first line to be installed by the Government because of interrupted railway service.

In the meantime the Department has announced that it is now prepared to keep all first-class and paper mails moving and that it has mobilized a sufficient fleet to handle the situation. From all sources the Department has announced that it has succeeded in securing 23,200 trucks, which are either now actually available for use or will be by the last of this week.

The Department will have available 5000 trucks of its own, arrangements have been made for the use of 15,000 belonging to the Agricultural Department, 200 have been secured from the Navy Department, and by the last of this week 3000 will be turned over by the War Department.

Postmasters throughout the country have been notified to make a survey immediately ascertaining the possibilities of additional trucks from Government agencies in their immediate vicinity other than those owned by the Post Office Department. All postmasters have been

DATES AND PLACES FOR MAJOR SHOWS

NEW YORK, July 18.

The directors of the National Automobile Chamber of Commerce have decided to use the Grand Central Palace again for the 1923 show, which will be held the week of Jan. 6-13. The Chicago show will be held from Jan. 27 to Feb. 3 in the Coliseum and the First Regiment Armory as usual.

instructed to notify the Department in Washington by wire.

The Department reports that already state motor transport associations, automobile clubs and other automotive associations have volunteered the use of private owned trucks.

Krebs Will Operate Collier Truck Plant

BELLEVUE, OHIO, July 18—J. C. L. Krebs, who organized the Krebs Motor Truck Co. with a capital of \$100,000 to market the product of the Collier Motor Truck Co., has decided to go into the manufacturing branch of the business himself. Because it lacked working capital with which to build the trucks for which Krebs obtained orders, the Collier company has been placed in charge of R. R. Parkhurst, of Bellevue, as receiver.

Krebs has taken a lease on the plant of the Collier company and will acquire its inventory. The capital of the Krebs company will be increased from \$100,000 to \$300,000. The truck which it will make will be an assembled product.

THOMART TO CUT CAPITAL

AKRON, O., July 17—A special meeting of stockholders of the Thomart Motor Co. has been called for July 24 to approve a reduction in capitalization. The plan submitted by the directors provides for a decrease in preferred stock from \$5,000,000 to \$2,000,000 and a reduction of no par common stock from 100,000 to 70,000 shares. The decrease is suggested as a means to reduce taxes, according to the letter sent to the stockholders. The company's plant is located at Kent.

CANADA SHIPS TO 41 COUNTRIES

WASHINGTON, D. C., July 14—Passenger cars were shipped during May to 41 countries from Canada, according to the export statistics from that country transmitted to the Automotive Division of the Bureau of Foreign and Domestic Commerce. The Canadian shipments totaled 2562 cars valued at \$1,498,276; 251 motor trucks valued at \$112,156, and parts valued at \$117,870. The overseas shipments of cars and trucks from the United States during the same month were 6798 passenger cars and 1203 motor trucks.

Federal Producing Fast One-Ton Unit

Express Model to Sell for \$1,375 —Will Enter Foreign Markets

DETROIT, July 17—A new model, known as the Federal Fast Express, with a nominal capacity of 1-ton, has been brought out by the Federal Motor Truck Co. This new delivery type truck has a chassis weight of 2950 lb., with a body allowance of 900 lb. It is mounted on a 132 in. wheelbase chassis with 56 in. tread and has a loading space back of the seat of 110 in.

The engine is a Continental J-4, which is the same unit used for the past 2 years in the Federal Model S-D.

The truck is distinctive in that, although of small capacity, it is worm drive, employing the Timken units. Other parts used include Eisemann magneto, Zenith carburetor, Oakes fan, Long radiator with the core in a heavy pressed steel shell, Borg & Beck clutch, Detroit Gear and Machine gearset, Peters universal joints, Gemmer steering gear, Stewart-Warner vacuum tank, Distel wheels, U. S. Royal cord tires, Alemite chassis lubrication, Remy starter and generator and Exide heavy truck service type of battery. Chrome vanadium steel springs have been adopted.

The clutch is a 10 in. type. The gearset is a sliding selective type and in conjunction with the 5.6 to 1 reduction in the rear axle gives a final reduction of respectively: 5.6 to 1 on high, 9.4 to 1 on second, 17.4 to 1 on low and 21 to 1 on reverse.

Will Seek Export Business

The Federal company has made arrangements to furnish any style body mounted and painted ready for work. There are in all thirty-two different combinations of seats, bodies, windshields and cabs which have been worked out to fill practically every need of express or delivery work for which this chassis would be called upon. Many of the combinations are interchangeable on the same body and with the same top. Production on these models started July 5, and it is expected that by Aug. 1 demonstrators will be in the hands of all Federal distributors. Owing to the magneto ignition equipment and the adaptability of the truck for various road conditions, it is expected that considerable export business may be secured with it. The price of the chassis is \$1,375, f.o.b. Detroit.

ROLLS-ROYCE MAY EXPAND

MILWAUKEE, July 17—Plans for broadening the distribution of the Rolls-Royce are made evident by a conference held by R. B. Jackson, the western sales manager of the company, with officials of the Milwaukee Chamber of Commerce relative to the establishment of distributing headquarters in this city.

Strive for Better Coordinated Cars

Mechanical and Body Refinements to Appear—Makers Jealous of Prestige

DETROIT, July 17—Many changes in specialized units entering into the construction of cars will become known with the announcement of new models by companies within the next thirty days. Throughout the industry the striving for better coordinated cars is apparent, and is perhaps more marked than at almost any time in the development of motor car transportation. Every effort is being made by manufacturers to correct weaknesses in their products, in many cases weaknesses which might never be known to an owner, but which to a mechanical mind present possibilities of creating disfavor.

Many changes are designed to extend the scope of the car in certain particulars, aims which were impossible in using the former units. Many of these cars which will undergo changes have been enjoying wide popularity and apparently were giving the utmost in owner satisfaction. Refinement of parts, however, which would add to general efficiency, has impelled engineers to make changes which would make certain of the cars retaining their position.

There is no disposition in the industry to take chances on parts merely because they have been satisfactory in the past. Unit makers bringing out more efficient products find the industry wide open to receive them. In this they are particularly benefited by the inventory situation in most factories, which, by reason of the vogue of the short time commitment, leaves factories free to change their units within a very limited time.

In body construction there is a similar striving for greater comfort and convenience. Closed bodies, with the exception of the types designed almost exclusively for business purposes, are becoming more commodious, even in the lower priced models. More attention is being given to the upholstering of interiors and the fittings are more artistic in design.

The development of demand for closed vehicles has brought about a period in which nice coach work on a production basis is all important. The tendency of prices in these will be downward, and the character of the workmanship will be much higher. Cars for the fall business will be the first to indicate the manufacturers' plans along these lines.

NEW PUMP UNIT APPEARS

CHIPPEWA FALLS, WIS., July 17—The North Light & Manufacturing Co., Chippewa Falls, Wis., is bringing out a new unit which is a combination of a gas engine with a Uniflow pump, with automatic control. Water pressure is used to start the engine. The unit is

designed for farms and country homes and is expected to take place of the windmill and other devices used to furnish water supply. The Chippewa concern has recently closed a 10-year contract with a large St. Paul jobbing house calling for the delivery of 1000 pumps of various sizes each year. The average price is \$200, making the order valued at \$2,000,000.

Receivership Asked for Maryland Motors

WASHINGTON, July 18—Receivership for the Maryland Motor Co., Charles H. Kehne, president, of Frederick, Md., a \$1,000,000 corporation, has been asked by the company's creditors and stockholders who allege that the company has been mismanaged, and as a consequence is insolvent.

Capital stock of the company was originally \$250,000, par value of \$50 per share. After selling a large number of shares of stock, Kehne is alleged to have incorporated the company for \$1,000,000 under the laws of Delaware and to have paid unearned dividends aggregating \$20,000 to effect the sale of stock. In addition to an investigation of the affairs of the company, the court has been asked to set aside alleged fictitious transfers of stock.

Plans of the company contemplated the manufacture and sale of a "medium priced" passenger car. None, however, were ever manufactured.

On July 15 the directors declared a quarterly dividend of 2 per cent on the preferred shares, payable Aug. 15 to holders of record July 31.

"Copper Cooled" Line to Appear in August

DETROIT, July 18—General Motors Corp. has placed commitments for material for 5000 of its new "copper cooled" cars, shipments to begin in August. The corporation is planning to get into production on a small scale in August. The commitments are intended for first work on the new car and will cover production over a period of several months.

The first cars in the "copper cooled" line will be built at the Chevrolet factories in Flint, but no announcement has been made as to whether this car will bear the Chevrolet nameplate. Prices will be higher than the Chevrolet 490 line, but the car will be in the low priced field and is intended to meet the demand for a low priced air-cooled vehicle.

LONGER LINCOLN WHEELBASE

DETROIT, MICH., July 17—The Ford Motor Co. announces that the length of the wheelbase of all Lincoln cars has been increased to 136 in., with the exception of the coupe which is still being built on the 130 in. wheelbase. A price change has been announced both on the 7 passenger and sedan. The seven passenger is raised from \$3,300 to \$3,800.

Will Take Claims to Federal Court

Overland Files Answer to Willys Corp. Petition—Hearing August 1

TOLEDO, July 17—That the settlement of claims and counterclaims in the dispute between the receivers for the Willys Corp. and the Willys-Overland Co. will have to be threshed out in Federal court here, became apparent this week when the Overland attorneys filed an answer to the intervening petition filed by the Willys Corp. receivers.

The receivers—Francis G. Caffey and Frank Kennison—had asked for claims and damages amounting to an estimated total of between \$5,000,000 and \$7,000,000 growing out of a sale of common stock of the Overland to the corporation and also out of the contract to manufacture and sell the Chrysler Six.

The Willys-Overland has claims totaling somewhat more than \$5,000,000 against the Willys Corp.

In asking the dismissal of the intervening petition of the receivers, Overland also asks that its claims be allowed and that it be protected so as to receive its share in any distribution of the assets of the corporation.

Attorney George Hahn and Receiver Kennison left Saturday for New York to finish up the affairs of the Electric Auto-Lite division recently sold.

The court has set Aug. 1 as the hearing date for the big claims between the two companies.

N. A. C. C. Data Show Good Summer Ahead

NEW YORK, July 18—Retail sales data gathered by the National Automobile Chamber of Commerce for the information of its directors show that prospects for July and August are better than the seasonal outlook for the mid-summer months. Cities which state that sales for the next six weeks probably will be "very good" are Denver, Peoria, Des Moines, Cleveland, Sioux Falls, New York, Seattle and Kansas City.

Reports of a slight seasonal decline were made by Indianapolis, Boston and Richmond.

Atlanta reports that the outlook for July and August is not good and there has been a considerable decrease in Detroit.

All these cities without exception report that the prospects are good for closed car business in the fall.

The used car market is good in Denver, Boston, Detroit, Sioux Falls, Richmond, Seattle, Kansas City and Los Angeles. It is slowing up in Peoria, Indianapolis, Fargo, Atlanta and Cleveland.

The reports generally give little encouragement for increased truck sales for the next six months.

Big Earnings Shown By General Motors

Nearly \$27,000,000 in First Half
for Common Stock—Bank
Loans Paid

NEW YORK, July 20—Preliminary estimate of the income account of the General Motors Corp. for the first six months of 1922 shows net earnings of \$26,839,391 on the common stock.

Net sales for the half year aggregated \$218,490,887, of which \$137,800,000 were in the second quarter. Net earnings, before Federal taxes and interest charges, were \$35,116,481 with \$25,970,000 in the second quarter. Net earnings, after all charges, for the six months were \$29,997,391. Dividends on the preferred and debenture stock for the six months required \$3,158,000.

In the six months ending June 30 approximately \$6,200,000 net was added to reserves for depreciation, and the balance in these reserves now stands at \$43,700,000.

All bank loans were paid off by June 30, and except for approximately \$5,400,000 of purchase money obligations, General Motors Corp. has no indebtedness underlying its preferred and debenture stock, except ordinary current accounts payable for merchandise, etc. Cash in bank as of June 30 was approximately \$35,000,000.

Net working capital as of June 30 was approximately \$123,000,000, an increase of \$26,000,000 over December 31. Inventories, which were written down to cost or market on December 31, are well balanced and have been reduced to below \$98,000,000, a reduction of some \$10,000,000.

The preliminary statement demonstrates that there has been sound reason for the recent activity in the General Motors common stock, and that, if earnings continue at anything like the present rate, the corporation soon will be in a position to resume payments on the common.

BOOSTING GOOD ROADS

WASHINGTON, July 18—Federal-aid good roads are being boosted by Thomas H. MacDonald, chief of the Bureau of Public Roads, Department of Agriculture, who is now touring the United States in the interest of better automobile highway transportation. Particular attention to the planning of the Federal aid system of highways, for which meetings will soon be held, is being given.

OVERLAND PROFITS LARGE

TOLEDO, July 19—The position of the Willys-Overland company has been greatly improved in the last three months. May was the first month in a year and a half to return a profit of a definite nature of more than \$600,000.

June profits are believed to have been between \$900,000 and \$1,000,000. Inventories have been reduced to \$19,000,000 as compared to \$35,000,000 at the end of 1920. The company has approximately \$10,000,000 in cash. Production for the second quarter was approximately 33,000 compared with 17,000 for the first quarter. The first half year thus exceeded by 2000 the total output for 1921.

Jackson Bondholders Get Associated Stock

NEW YORK, July 19—Holders of the \$1,000,000 issue of 7 per cent bonds of the Jackson Motors Corp., which were due July 1, will receive securities of the Associated Motor Industries junior to the bonds of the new company in a ratio of 125 per cent of the par value of the Jackson bonds. It is understood that these securities also can be transferred equally for priority stock of Roland A. Crandall & Co., a Chicago finance corporation associated with the merger.

Jackson Motors was the first of the companies now in Associated Motors to transfer its bonds.

While the Kentucky Wagon Mfg. Co. of Louisville undoubtedly will become a part of the Associated Motor Industries, it has not actually been transferred to the consolidation, and many details in this connection remain to be worked out.

Farming Association Aids Manufacturers

CHICAGO, July 18—The Progressive Farming Committee, which is part of the National Institute of Progressive Farming, met in Chicago and after reviewing the accomplishments of the institute since it was inaugurated this spring adopted a budget providing for the raising of \$30,000 beyond what has already been paid in order to cover the expenses of the remainder of this year.

Substantial increases in their appropriations have been made by members of the committee and an effort is being made to obtain additional subscribers among all members of the institute.

Guy H. Hall, director of the institute, made a report showing that in 30 days of active operation the information service sent out by the institution has been published in whole or in part in newspapers and periodicals having approximately 40,000,000 readers.

Following its meeting the committee issued a statement declaring that in its belief the National Institute of Progressive Farming has proved of great value to manufacturers of power farming equipment.

COMPILES GOOD ROAD FUNDS

WASHINGTON, July 17—Compilations of funds now available, made by the Bureau of Public Roads, Department of Agriculture, for automotive highway construction, show that there is approximately \$750,000,000, which includes the Federal as well as local funds.

G. M. Develops New Dealers Contract

Uniform Type with Sliding Scale
Provision—Can Be Cancelled
Only for Cause

DETROIT, MICH., July 18—Following a series of conferences between executives of the several car manufacturing divisions of the General Motors Corp., a contract with dealers has been developed which will embody the best features of former contracts of the several units and make them available to dealers in all cars made by the five divisions of the corporation.

The contract itself is made in perpetuity with the dealer and can only be cancelled for cause. Each division will continue as formerly to enter into contracts with its dealers, and these contracts will be filed with the division headquarters. Complete authority in the merchandising of its products is vested in the producing division.

Under the new form of dealer relationship, there will be no renewing of contracts at stated intervals, but, instead, changes that may be advisable from time to time will be made in the form of appendixes to the contract proper. These will vary according to the needs of the particular manufacturing divisions.

An outstanding feature of the contract is that it provides discounts according to the volume of business done by the dealer. There is a sliding scale which gives every dealer an opportunity to increase his earnings by increasing his business. In providing for this the corporation wishes every man to know the basis upon which he is doing business.

Through the contract it is hoped to establish division control over the freight and handling charges incident to the shipping of cars, so that each division may be in position to know just what its products should retail for in any given section of the country. The fixing of these charges have up to this time rested with the dealer entirely and varied largely. Under the contract these charges will be brought to a more uniform basis.

GEORGES RICHARD KILLED

PARIS, July 11 (By Mail)—Georges Richard, founder and president of the Unic Automobile Co., was killed in an automobile accident near Rouen. Richard, who was 59 years of age, had been very closely connected with the French automobile industry from the earliest days. In 1892 he founded the Georges Richard Cycle Co. and entered the automobile field two years later. About 1896 he went into partnership with Brasier and formed the Richard-Brasier Automobile Co., building cars which were very successful in early races. In 1904 Richard dissociated, formed the Unic Automobile Co., which he controlled until the time of his death.

Ford Mexico Plant Depends on Survey

Investigation of Advantages Not Complete—Coahuila Offers Inducements

DETROIT, July 19—The Ford Motor Co. stated to-day that it has not yet definitely decided to erect an assembly plant at Tampico, Mexico, and that no action will be taken for several weeks, pending investigations now being made into Mexican trade conditions. Unless the company is convinced that the potential business warrants the erection of a plant, it will not be built. This business now is being served by shipments from the plant at Houston, Tex. While shipments are being made steadily, they are not of record proportion, as they were last year.

If it finally is decided to erect a Mexican plant, it will serve most of the territory in that country, and distribution in the United States will be changed somewhat to take care of the surplus production of the Houston plant.

In the course of its investigation, representatives of the Ford company have conferred with the governor of the State of Coahuila, who has assured them that the Ford company will be given all possible facilities, including the donation of land, exemption from taxes, for at least fifteen years, and any other concessions which may be possible.

It is recalled that, when the invasion of Mexico was discussed several years ago, Henry Ford said: "Let me invade Mexico with factories and give the people of that country something to do; then there will be no more war there."

Pierce-Arrow Will Readjust Finances

NEW YORK, July 19—Bankers for the Pierce-Arrow Motor Car Co. are working out a readjustment of the company's financial affairs, but the details have not been divulged. It is stated officially, however, that some new securities will be offered. Bank loans have been reduced another \$250,000, which brings them down to \$7,900,000.

The company has rearranged its production departments to speed up output and sales are said to be steadily expanding. The high priced inventory has been practically liquidated, and the company now is in position to take advantage of current conditions. The sharp price cut is expected to stimulate sales.

S. A. E. PRODUCTION MEETING

NEW YORK, July 19—A national meeting of the Society of Automotive Engineers will be held in Detroit, October 26 and 27 to discuss problems of automotive production. Papers relating to production problems will be read at the morning sessions each day, and the afternoons will be devoted to factory

inspection trips. These inspections will appeal particularly to tool, inspection and production men. A dinner will be held the evening of Oct. 26. K. L. Herrmann is chairman of the committee which is arranging the program.

Durant Production Hits 5886 in June

NEW YORK, July 19—Durant Motors, Inc., turned out 5119 fours and 767 sixes, a total of 5886 cars, in June. July production will somewhat exceed 6500. June output was divided among the different plants as follows: Long Island City, 2587; Lansing, 2191; Leaside (Toronto), 341; Muncie, 767.

A total of 24,456 Durant cars now has been produced.

The first of the new Stars will be delivered from the Long Island City plant Saturday. The company took formal possession of the Willys Corp. Elizabeth plant on Tuesday of this week. Large quantities of parts for the Star were on the sidetracks adjoining the factory, ready to be unloaded, and it now will be possible to get into production within a very short time.

Associations Draft Code for Air Safety

WASHINGTON, July 17—Low flying over crowds or trick flying over any densely populated area will be prohibited by the aeronautic safety code which is being drafted by the Bureau of Standards, the National Aeronautic Association and the Society of Automotive Engineers.

The draft of the safety code is tentative, but its principal provisions will include:

Inspection of aviators and aircraft in connection with the granting of licenses to pilots and air transportation companies.

Prohibition of dangerous proximity of aircraft in flight; rules governing personnel and equipment of airdromes, including medical and signal equipment; aircraft radio regulations; rules for landing fields; lighthouses for night flying and landing.

Bellanger to Show Big Loss for Year

PARIS, July 8 (*By Mail*)—A loss on the year's working of more than 15,000,000 francs will be shown on the balance sheet of the Bellanger Automobile Co. This loss has to be added to a deficit of 4,342,506 francs for the preceding year.

In addition to a couple of very high-grade automobiles of its own construction, the Bellanger company is marketing a low-priced car assembled in Paris with parts imported from Detroit. Benjamin Briscoe was responsible for the introduction of this plan and for the shipment of the American parts. In addition to its automobile branch, Bellanger is building Diesel engines and has aviation contracts in hand.

All-Japanese Car Now in Production

Los Angeles Designed Vehicle—50 Per Month Made at Osaka

LOS ANGELES, July 18—A Los Angeles engineer, William R. Gorham, has designed and developed the first automobile to be successfully manufactured and marketed in Japan. He is the sponsor of the Jitsuyo, which is now being turned out at the rate of fifty per month in the factory of the Jitsuyo Jidosha Seizo Co. of Osaka. It is reported that there will be an early increase in production to 100 cars monthly.

Advices from Japan state that the Jitsuyo will probably cut considerably into the sale of the lower-priced American cars in the Japanese market.

The outstanding features of the Jitsuyo are its small size and extremely simple control. In designing the car, Gorham had in mind a vehicle that should supplant, at least in part, the ricksha for passenger transportation, and the control adopted is so simple that it can be readily mastered by a ricksha coolie. There is no steering wheel, its place being taken by a simple handle held in the left hand. The clutch and brake pedals, and the gear shift lever, are eliminated, and the entire control is accomplished by one lever situated on the right side of the machine. Pushing forward this handle engages the friction transmission. When it is pulled back it disengages the friction wheels, and if pulled further back applies the brakes. The extreme outer side of the rear position engages the reverse.

This is probably the simplest form of control ever incorporated in a gasoline automobile.

No Garage Needed

The wheelbase is 72 in. and the tread 38 in. The makers point out that no garage is necessary, as the Jitsuyo can be parked in a doorway, or in the ordinary ricksha house.

The engine is a two-cylinder air cooled type, similar to those found on the larger motorcycles, with a 3-in. bore and a 4-in. stroke. The construction is F-head, the inlet valves being in the head, operated by rocker arms, and the exhaust valves in the side.

The flywheel performs a triple function. In addition to serving as a balance for the engine, it is provided with vanes, and acts as a blower in pulling hot air away from the engine, greatly facilitating the cooling. It serves also as one of the two friction discs of the friction transmission. This is one of the most original features of the car.

The frame is ¼ in. by 2 in. angle iron, wheel braced, and inswept at the front.

The machine was originally produced as a three-wheeler, but a four-wheel model has been developed and is now in production.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

On July 14 call money was obtainable at 2½ per cent, the lowest official quotation since 1918. The range for the week was 2½ per cent to 4½ per cent, as compared with 4 per cent to 5 per cent in the previous week. General ease was noted in the time money market. Sixty and ninety days' and four months' maturities covered a range of 4 per cent to 4½ per cent, and five and six months' were quoted at 4¼ per cent. Although quotations remained at the levels ruling a week ago, offerings were in larger supply, and a considerable amount of business was transacted for the longer maturities. The prime commercial rate remained unchanged at 4 per cent.

Federal Reserve

The Federal Reserve Bank of Dallas announced on July 12 a reduction from 5 per cent to 4½ per cent in the rediscount rate on all classes of paper. Only two institutions, Minneapolis and Kansas City, now maintain a 5 per cent rate.

The Bank of England, on July 13, announced another cut of ½ of 1 per cent in its minimum discount rate, bringing it down to 3 per cent, the lowest rate since January 29, 1914. The high record of 10 per cent was reached on August 1, 1914. The 3½ per cent rate had been in effect since June 15 last. This action on the part of the Bank of England is taken in some quarters as an indication of a possible lower range of our own reserve bank rates in the near future. Earlier in the week the Bank of Italy reduced its rate from 6 per cent to 5½ per cent. In this case the 6 per cent rate had been in effect since May 11, 1920.

Crop Reports

The Government crop report for July 1 shows in general a good average. The condition for corn is reported at 85.1 per cent of normal, as compared with 91.1 per cent last year. This would indicate a crop of 2,860,000,000 bushels against an estimated final yield of 3,081,251,000 bushels from the crop of 1921. The July 1 condition of winter wheat showed a reduction of 39,000,000 bushels, as compared with the amount indicated by the Department of Agriculture's estimate of June 1. This reduction is primarily due to the heat and drought. The estimated yield of spring and winter wheat combined, however, is 817,000,000 bushels, as compared with a final yield of 794,893,000 bushels from the crop of 1921. This year's estimate is the sixth largest crop on record.

The Federal Reserve statement as of July 12 showed an increase of \$15,156,000 in gold reserves and \$23,111,000 in total reserves. Bills on hand decreased \$66,320,000 and total earning assets \$60,051,000. Deposits showed an increase of \$40,235,000 while Federal Reserve notes in circulation declined \$36,201,000. As a result, the reserve ratio increased from 76.8 per cent to 77.3 per cent.

Native Production of Alcohol Urged

Movement in India to Utilize Waste Matter in Motor Fuel Production

LOS ANGELES, July 18—An unusual movement has been launched in India which has for its purpose the encouragement of the native agriculturists to utilize the waste vegetable resources of the country in the manufacture of fuel alcohol for use in motor cars, as an alternative for gasoline.

Temperance reformers in India are especially interested in the movement. Promoters of the idea expect that if the people will distill alcohol commercially for fuel, the drink problem will be solved.

One of the most difficult problems in India at the present time is that the agricultural classes have cut down their food crop areas in order to give more room to so-called "money crops"—cotton, oil seeds and so on. It is now being urged that they be led similarly to distill alcohol for sale and profit rather than for getting drunk.

In most districts in India, where the mowhra trees are plentiful, it has been said that it is impossible to keep the people from getting drunk. They have always distilled the mowhra for drink. "But would they continue to do so if they could make it into a saleable article like fuel alcohol, and would they not in that case distill for money rather than for drinking?" asks a Bombay leader of the movement. "The temperance reformers might consider whether there could not be organized a scheme whereby the people could be induced to bring distilled spirits to a collecting center or centers where it could be refined and whence it could be distributed for motor car use. It ought to be possible to market the product for considerably less than current gasoline prices.

HAS CALIFORNIA SUBSIDIARY

NIAGARA FALLS, N. Y., July 18—U. S. Light & Heat Corp. of California has been organized as a subsidiary of U. S. Light & Heat Corp., manufacturer of USL storage batteries, railroad car lighting devices and electric arc welders. A site has been leased and construction started on a new plant at Oakland, Cal. The purpose is to enable the corporation to handle more efficiently its growing business on the Pacific Coast. It is anticipated that production will start in the new factory about Oct. 1.

EMPLOYMENT NEAR WAR FIGURES

KOKOMO, July 17—Kokomo's ninety-seven factories are now employing within 10 per cent of the maximum number at work during the war, according to O. C. Phillips, examiner of free employment for the government. The Haynes plant has 1800 people as against 1600, the high mark of normal times.

FINANCIAL NOTES

Witwer Battery Co. of East Chicago, formerly known as the O. K. Giant Battery Corp. has begun work on a modern factory at Danville, Ill., the Chicago plant ultimately to be closed. Capitalization has been set at \$500,000 of which \$50,000 will be invested in buildings. It is stated that 100 men will be employed at the start. The plant will manufacture a storage battery with a non-liquid electrolyte and will begin with a production of 500 daily.

Yellow Cab Co., Chicago, has declared three regular monthly dividends of 33⅓ cents, payable Aug. 1, Sept. 1, and Oct. 2 to stock of record July 20, Aug. 21 and Sept. 20 respectively. The Yellow Cab Mfg. Co. has declared three monthly dividends of 50 cents, payable the same dates. The previous monthly dividends were 60 cents.

Ohio Motor Vehicle Co.'s, Cleveland, Ohio, plant and assets are being advertised for disposal in accordance with a court order in a receiver's auction sale on Aug. 1. The company manufactures Ferris cars and Ohio trailers. The receivers are William E. Ferris and Norton McGiffin.

King Motor Co. will soon pay creditors a 29 per cent dividend according to a statement made by Robert D. Brownson, receiver for the company, who has filed a preliminary report showing that preferred claims of \$350,000 have been paid in full or compromised.

Russell Motor Car Co., Toronto has declared a dividend of 1¼ per cent on the common stock as well as the regular quarterly dividend of 1¼ per cent on the preferred, both payable Aug. 1 to stockholders of record July 20.

Durant Motor Co. of New Jersey has filed certificate of incorporation with a capital of \$80,000 in shares without nominal or par value. The incorporators are John P. Schermerhorn, Randolph Payton and William B. Daley.

H. H. Franklin Mfg. Co., Syracuse has declared a regular quarterly dividend of 1¼ per cent on its 7 per cent cumulative preferred stock, payable Aug. 1 to stockholders of record July 20.

Tonneau Shield Co., Inc., New York City has opened a branch at 1828 Van Ness Ave., San Francisco to care for the Pacific Coast. Charles Emanuel is in charge.

The Van Keuren Co., Boston 34, Mass. has ready for distribution a catalog of modern measuring tools.

WORKERS IN DEMAND

MILWAUKEE, WIS., July 17—Analysis made by a Milwaukee daily newspaper of the increase in its classified advertisements indicate that the automotive industries are responsible for a considerable part of an increase of 500 per cent in the call for workers during the first half of July, compared with the corresponding period of 1921. The increase over the first half of June, 1922, is 100 per cent. The A. O. Smith Corp., pressed steel frames, drop forgings, stampings, etc., is daily advertising for 300 to 400 men for permanent positions to recruit forces of all departments to full strength, despite the fact that a 24-hour schedule is now in effect.

INDUSTRIAL NOTES

Waukesha Foundry Co., Waukesha, Wis., manufacturer of brass castings, is planning to start work immediately on the erection of additions to increase at least 100 per cent of the shop built a little over two years. The plant has been in continuous operation since that time and is now badly handicapped in filling orders by lack of production space and facilities. Originally it served largely the manufacturing plants in Waukesha, but the trade territory has expanded to embrace Milwaukee, Chicago, Detroit, Cleveland and Indianapolis.

Falor Manufacturing Co., Akron, organized a year ago by Aaron Falor, formerly with the Goodyear Tire & Rubber Co. for the manufacturing of inner tubes is making preparations to move into the former B. & W. Rubber Co. plant at Betts Corners, the new industrial suburb of Akron. The company leased the new plant several months ago and purchased the old machinery and additional new equipment. Present small plant on Sweitzer avenue has been operated 24 hours a day during the larger part of the first six months of the year.

Standard Auto Parts Co., Pontiac plant, occupied chiefly at present with Ford spring contracts, is maintaining production during July on a basis about equal to that of June, according to factory officials.

The expected lull in business, which had been taken into account in earlier statements of this company, has not been experienced and indications are that it will not be immediately felt.

Hess-Bright Co., reports an increasing demand for ball bearings, with orders and inquiries being received daily. A shortage in some lines of skilled labor is mentioned by an officer of the company.

The first three months of the year resulted in the production of the Standard Steel & Bearings, Inc., being more than doubled, although there is a slight let-up at present.

Edward G. Budd Manufacturing Co., Philadelphia and its affiliated company, the Budd Wheel Corp., are employing 4,200 men and women, at full capacity, with prospects for good future business. Edward G. Budd, president, says that business is much better than it was six months ago and that he looks for steady improvement. A night shift has been put on at the former plant.

Bellstrom Motors Co., St. Louis, Mich., plant and equipment has been bought from the receiver by the Par-Kar Coach Co., Detroit, which will make a special line of buses, complete with bodies. C. O. Westfall, president of the Par-Kar company, is well known as a transportation expert, having operated fleets of buses and trucks in many sections of the middle west.

Motor Wheel Co., Columbus, Miss., automobile spoke manufacturer, has closed a deal for a building there, where it will engage in the manufacture of spokes on a large scale as soon as the machinery can be installed. The plant is expected to be in operation by Sept. 1, and will employ about fifty people, it is stated.

Douglas Motors Corp., manufacturer of the Douglas truck, has started the production of trucks after a shutdown. The corporation has a good stock of raw material and motors on hand, and new trucks are turned out now only as ordered.

Campbell - Ewald Co., Detroit, is now located in the General Motors Building, occupying a suite of offices on the thirteenth

MOTOR PERAMBULATOR APPEARS IN LONDON

WASHINGTON, July 18—"Auto-lets" are the latest thing in London for the smart set, says a cable to the Bureau of Foreign and Domestic Commerce. An "autolet," it is explained, is really an electrically driven perambulator, designed with noiseless motors, which propels the baby "trucks" along at a four mile clip, while nurse stands behind on a kind of raised platform, like a scooter, at the back of the vehicle.

floor adjoining the advisory staff offices of the General Motors Corp.

Messenger Manufacturing Co., Des Moines, has taken over the manufacture and sale of all the products formerly produced by the Auto Metal Parts Co. of this city.

Brooke, Smith & French, Inc., Detroit, are now located in new offices at John R and Eliot Streets, where they have taken over a former residence property.

Want Parenti Plant Sale Declared Void

BUFFALO, N. Y., July 18—About 1000 stockholders of the defunct Parenti Motor Co., Inc., living at Farrell, Sharon and New Castle, Pa., filed papers in the Federal Clerk's office here yesterday through an attorney, asking that the sale of the company, by the Marine Trust Co. as trustee, to the Hanover Motor Car Co. of Hanover, Pa., be declared null and void.

The out-of-town stockholders claim that the option given to them at the time the firm went into bankruptcy did not cover a long enough period, and it is now understood they are ready to buy the factory. The property is appraised at \$328,000.

Federal Judge Hazel appointed William C. Reilley temporary receiver of the property until the decision is made.

STANDARD MOVES OFFICES

PITTSBURGH, July 17—The Standard Motor Car Co. will move its general offices from the engine manufacturing plant in this city to its main plant at Butler, Pa. The plans were decided upon to expedite general business and promote economies impossible with the executive, engineering, sales and service departments so far removed from the factory. The new concrete and steel assembly building in which the general offices are located is of two-story construction, 800 feet long and 200 feet wide.

COLUMBIA TIRE STARTS PLANT

PORTLAND, ORE., July 18—Construction of the Columbia Tire Co. plant, Portland's newest industry, is now well under way, and the company expects to be in production by fall.

METAL MARKETS

Activity in the steel mills is one thing and activity in the steel market quite another. Present orders on steel mills' books suffice to carry most of them comfortably through the third quarter, especially so when the possibility of curtailment in production as the result of fuel shortage and other industrial complications must be taken into consideration. The kind of market activity that steel producers would like to see at this time is that which would show that consumers are giving some thought to the covering of their late September and early October requirements. There is precious little of that sort of market interest in evidence.

A few of the independent sheet mills are reported to have booked some business at the price levels of the Corporation, shipments to be made at sellers' convenience. That is the kind of business which, if it were sufficiently large in volume, would make the outlook for producers far more reassuring than it is. True it is that independent sheet rollers are working on a handsome budget of orders at satisfactory premiums over the price levels of the leading interest, but, somehow or other, the trade's thought centers on the outlook for business following the feverish activity of the present. The bulk of the business now on sheet mills' order books carries actual shipping orders, so that there is very little apprehension of cancellations. To that extent at least the situation appears to be thoroughly healthy. It is the lack of interest on the part of consumers, especially of those in the automotive industries, in other than spot or virtually spot shipments that is the fly in the ointment.

The leading sheet interest, the American Sheet & Tin Plate Co., which has sold practically all of its output until the end of September, is naturally in the best position in so far as concerns future business. The Corporation's conservative price policy is bound to attract consumers who want to safeguard themselves against future contingencies. On the whole, however, buyers' appetite is confined to material that can be shipped the same week in which it is ordered. In the pig iron market a somewhat peculiar situation prevails. Development within the last week seemed to indicate a weakening of prices. In thoughtful trade circles, however, the opinion prevails that beneath the surface a much stronger market is in formation. This opinion is based on the relatively low output of foundry and malleable iron and the impossibility of increasing it perceptibly within the immediate future. Those who profess to see the coming of rising pig iron prices also point out that the actual bare cost of production is far above the present market and that coke supplies are running lower and lower.

Pig Iron.—The market is a mighty tame affair, automotive foundries continuing to buy largely from hand to mouth.

Steel.—Cold-finished steel bars display an upward tendency, most producers seeking to establish the market on a \$3 per ton higher level than the 2.10c. quotation heretofore prevalent. Hot-rolled bars, the raw material for the cold-finished product, are not only rising in price but some sizes are difficult to obtain. Sheet bars are easier at \$35. Strip steel continues in excellent demand from automotive consumers. Alloy steel interests report satisfactory orders from the automotive industries, price levels remaining unchanged. Demand for automotive bolts and nuts continues good.

Aluminum.—A fair demand for aluminum body sheets is noted. Importers complain that some of the sheets arriving from Germany are filled with waves, blisters and buckles and that these imperfections are becoming much more numerous than formerly. One importer claims to have inquiries and orders for 250,000 pounds of body sheets. Ingot aluminum is moving slowly. Price levels are unchanged.

Copper.—Rolling mill copper and brass products have been advanced 1/2 cent per pound by the leading interest and independent producers have followed suit. Consumers are apparently covered and there is little fresh buying.

Tin.—The market is exceedingly quiet.

Lead.—Storage battery makers are buying moderate tonnages. The market is fairly steady.

Zinc.—Consuming demand has died down and the market is extremely dull.

Calendar

SHOWS

- Aug. 4-13—Chicago, Aircraft Exhibition and Aeronautical Congress.
- Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.
- Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.
- Sept. 23-30—New York, Closed Car Show, Grand Central Palace.
- Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under

the auspices of the Washington Automotive Trade Association.

- Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.
- Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.
- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon, Coliseum and First Regiment Army.

FOREIGN SHOWS

- March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

- Sept. 1922—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Association Automobilita Brasileira.
- Sept. 15-20—The Hague, Automobile Show.
- Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiser-Damm Hall under the auspices of the German Automobile Manufacturers Association.
- September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.
- Oct. 4-15—Paris, Automobile Show, Grand Palais.
- Nov. 3-11—London (Olympia), Automobile Show.

Nov. 10-Dec. 19—Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

- August 28-Sept. 2—Detroit National Safety Congress.
- Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.
- Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

U. S. Glider Tests Prove Successful

American Students Enter French International Contest—New Phase in Aviation

NEW YORK, July 17—The Aeronautical Chamber of Commerce announces what it describes as the first successful gliding tests in the United States since the Wright Brothers' experiments which ended in 1903. The latest experiments were made at Ipswich, Mass., by three students of aeronautics at the Massachusetts Institute of Technology who will participate in the first international gliding contests to be held Aug. 6-22 at Clermont-Ferrand, France.

The students are Edmund T. Allen, 26, of Chicago; Harry C. Karcher, 20, of Mansfield, Ohio; and Otto C. Koppen, 22, of Mamaroneck, N. Y. Allen formerly was a test pilot for the army air service.

The entrance of the United States into the international competition in France marks a new phase in the development of American aeronautics, according to officials of the Aeronautical Chamber of Commerce. Germany, deprived of the privilege of orthodox engineering, after the armistice, turned to motorless airplanes, and at a competition last fall, distances as great as 15 miles were traversed by gliders. France was quick to arrange for a general contest and experimentation has been going on ever since in most of the large nations of the world. There probably will be three score entrants in the French affair.

Allen, Karcher and Koppen constructed a glider at the M. I. T. laboratories and took it to a 50-ft. elevation at Ipswich. It rose in a 15 mile head wind. Altogether five successful flights were made. The velocity of the wind was such that the machine hovered practically the entire time. It reached a maximum elevation of 20 feet and advanced a maxi-

mum distance in one flight of 200 feet.

As the result of these trials, the young men, with the assistance of other aeronautical students at Cambridge, redesigned the glider into what they believe is the most efficient type yet produced anywhere in the world. The frail little aircraft has a span of 24 feet, a chord (or width of wing) of 4 feet 9 inches, and measures 16 feet overall. It is of spruce and fabric construction and weighs but 80 lb. The most successful of the famous German gliders weighs 149 lb. Yet the Cambridge craft has a factor of safety of four. It is asserted by the builders that the craft has greater ease of control than the ordinary type of plane, having ailerons, rudder and flaps, the full length of the monoplane wing.

New Earl Cabriole to Sell for \$1395

JACKSON, MICH., July 18—Earl Motors, Inc., has completed plans for a cabriole which will augment its line of closed cars, and which will sell at \$1395, f.o.b. factory. Production on the new car will be started at once, and deliveries will be ready in time for the opening of the fall business. The car is designed to meet the rapidly increasing demand for low priced closed models.

The chassis will be of standard Earl type, having 56 in. rear springs. The overall length will be 167 in. and the height 74 in. The top and sides of the rear tonneau are covered with black Duratex fabric, and the body panels will be finished in blue. The fenders and chassis are black enameled.

The upholstery of the car is gray Spanish leather. Door and rear quarter windows are lowerable, and the one-piece windshield swings either in or out. A rain and sun visor is standard equipment, as are also dome light and windshield wiper. At the rear is a trunk platform protected with maple slats in natural color. The rear body panel is protected by nickel slat irons.

New Open Body to Oldsmobile Line

Touring Model Priced at \$1,595—Mounted on Light-Eight Chassis

LANSING, July 18.—A new five-passenger open body is now being mounted on the light eight Oldsmobile chassis. This body has very similar lines to the four-passenger light eight which has been on the market for some time, and has been brought out to meet the demand for a body of greater capacity, the company states.

The fittings as well as the lines of this car are quite similar to the four-passenger model. The car is finished in a wine color known as Oriford Lake, and the side rails are of Circassian walnut. The instrument board, horn button, steering wheel and spokes and ball on top of the gear shifting lever are also of walnut. The upholstery is hand buffed brown leather. A new point is the flaring nickel-plated radiator shell and a black cowl ventilator.

The rear seat is 45 in. wide; front seat, 41 in. wide; doors, 21½ in. wide; leg room in rear seat, 29 in.; wheelbase, 115 in.

Equipment Modified

The top and side curtains are new design, the top being what is called the clear vision type; that is, free from side bows, permitting full view for rear seat as well as front seat. The new two-piece windshield is adjustable from the inside and is equipped with a weather strip. Standard equipment includes windshield wiper, rear vision mirror, tubular robe rail, and snubbers on the rear. Cord tires are provided as standard equipment and a single tire carrier, with spare rim, is mounted at the rear. The car is priced at \$1,595 f. o. b. Lansing.